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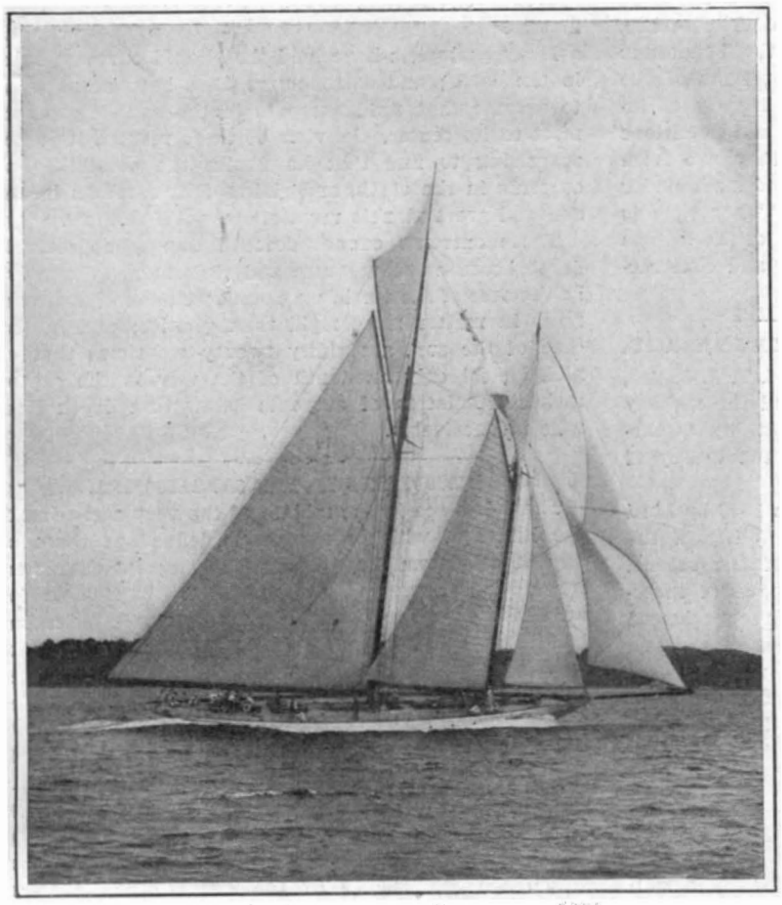
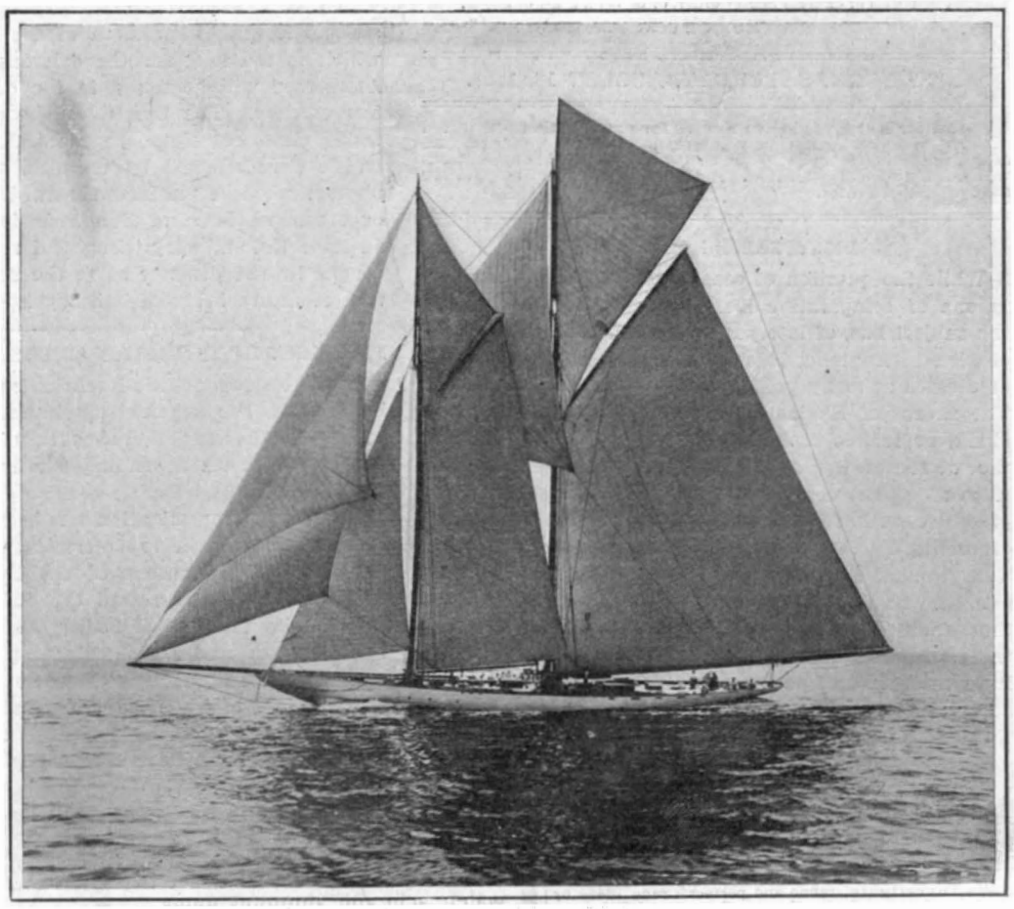
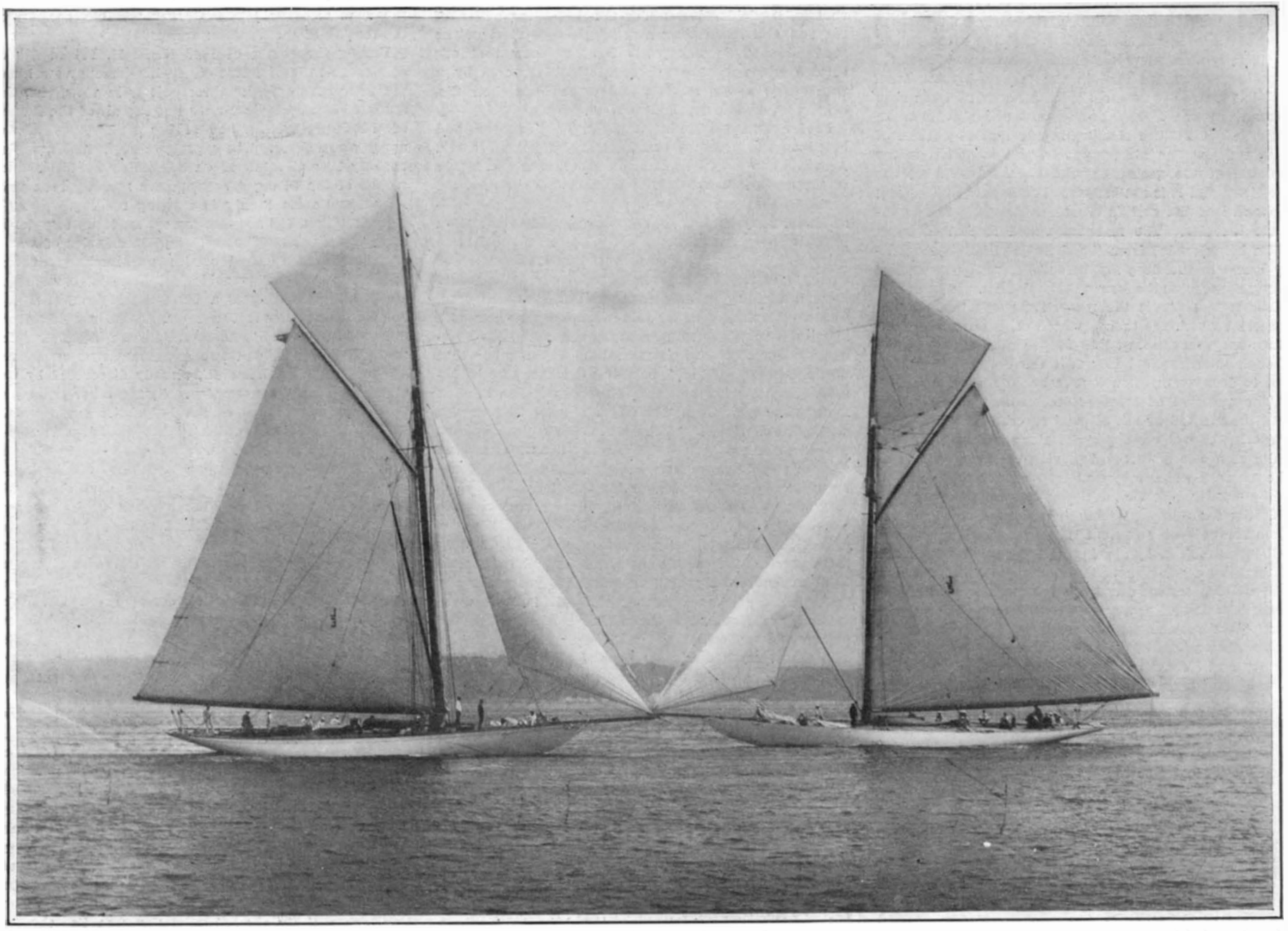


Length on Water-line, 90 feet.
Schooner "Queen." Second Position.



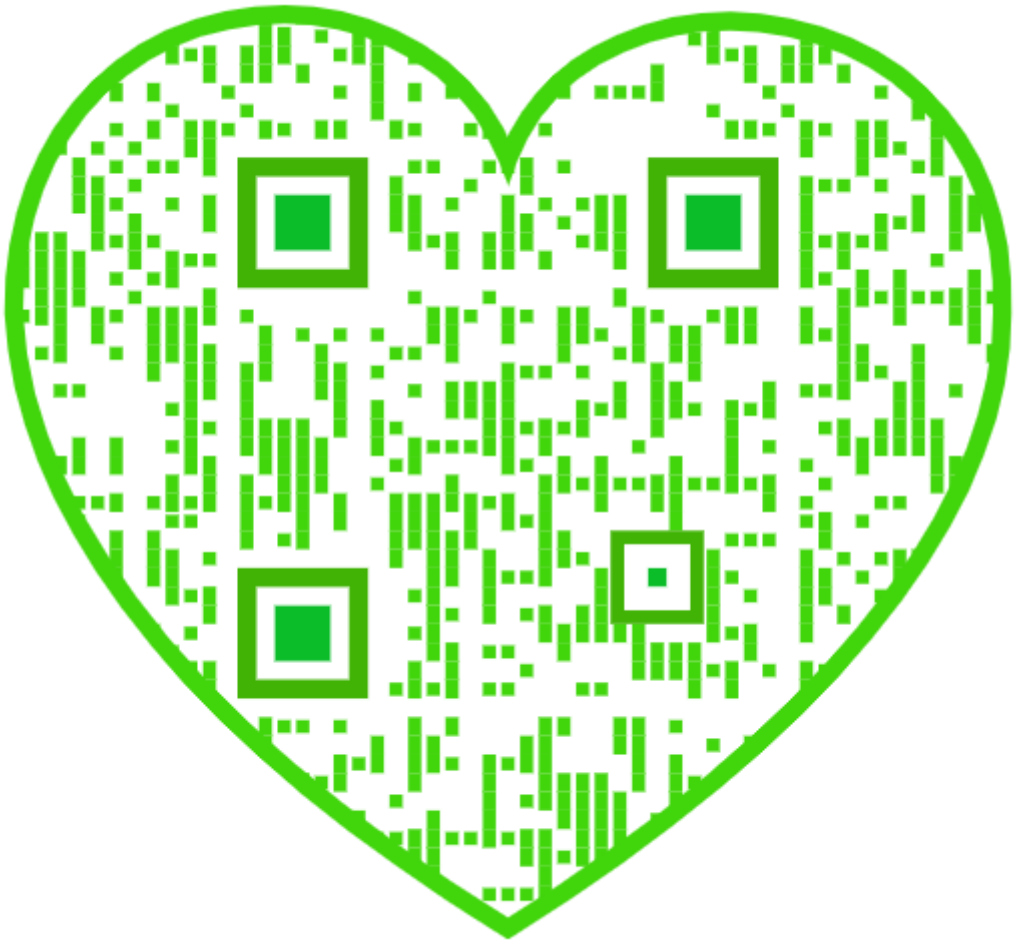
Length on Water-line, 87 feet.
Schooner "Elmina." Third Position.



Length on Water-line, 65 feet.
Sloop "Irolita." Entered, Did Not Start.

Length on Water-line, 65 feet.
Sloop "Effort." Winner of King's Cup.

CRUISE OF THE NEW YORK YACHT CLUB.—COMPETITORS FOR THE KING'S CUP.—[See page 112.]



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NEW YORK, SATURDAY, AUGUST 18, 1906.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

DISAPPEARING ENGLAND.

While the question of coast erosion and reclamation is one of comparative insignificance in this country, the subject has, of late years, aroused considerable discussion in England, because of the undoubted ravages of the sea at many points of the littoral of the island. The shores of England are composed largely of clay, chalk, or friable rock which is easily eaten away by the waves of the ocean or the strong currents and tides along the coast. In consequence great stretches of the shore have been worn away and are constantly crumbling further inland with each succeeding year. This gradual destruction has caused great damages to many towns situated on the seashore and has destroyed thousands of acres of valuable farming land. At certain locations, even within the memory of men still living, the sites of prosperous villages of former times are to-day covered by many fathoms of water, sometimes several miles from the present shore line.

Coast erosion following severe storms within recent years has been so marked at many points on the English coast that after extended press discussion a Parliamentary commission has been appointed thoroughly to investigate the subject, and if possible to devise means for the abatement of the injury. While there is little danger that the "tight little island" will completely disappear within the next few generations, there can be no doubt that coast erosion is causing serious loss of land at many points, particularly on the south and east coasts, notwithstanding that the areas gained artificially at other points almost compensate for it. It has been estimated that in the thousand years from 900 to 1900 an area of nearly 550 square miles has been worn away by the erosive action of the waves and ocean currents. That the changes in the littoral outline of England are due almost purely to this action is the opinion of the geologists who have investigated the question, and it is not believed that the subsidence and upheaval of the earth's crust are in any way responsible therefor. The material which is carried away after being eroded from the shore is either immediately borne to the deep sea in suspension, or is washed along the coast in the form of littoral drift. It is hardly possible to estimate the respective proportions of the material which are thus disposed of, but these proportions may vary from 20 to 90 per cent of the whole, though it is hardly likely that the proportion carried out to deep water often approaches the latter figure.

The question of coast protection is a difficult one, and the method in use at present, comprising the construction of walls and groynes along certain areas, results of necessity in the depriving of the foreshore of the material which might otherwise gather there. Thus while a uniform system of protective walls and groynes running from the walls out into the sea will, for the time being, largely prevent the erosion of the coast, it will nevertheless, by abating or largely decreasing the littoral drift, bring about the depletion of the foreshore and will ultimately cause the destruction of both protective walls and groynes. The question of coast protection and reclamation presents engineering difficulties of no mean magnitude, and the overcoming of these difficulties will constitute an interesting phase of future engineering history, for we feel certain that English technical men and men of science will find successful means for combating the destructive power of the sea.

AFTERMATH OF THE SAN FRANCISCO FIRE.

In drawing the proper lessons from a disaster of the magnitude of the San Francisco earthquake and fire, care must be exercised lest too great an emphasis be laid upon particular and unrelated incidents and effects. It has been claimed, and doubtless with some measure of truth, that in the early photographs of the fire, and particularly those of individual buildings or parts of buildings wrecked by the fire, that were published soon after the disaster, there was too much broad generalization based upon insufficient data. It is only now, after there has been time to gather and classify material in the way of photographs and observations by experts, that the public is being placed in possession of well-digested lessons drawn from the disaster. We have recently been favored with a large number of photographs and an extremely interesting discussion of the San Francisco fire and its lessons by Mr. F. W. Fitzpatrick, the secretary-treasurer of the International Society of State and Municipal Building Commissioners and Inspectors, of Washington. The article was called forth by some photographs showing the respective behavior of fireproof tile and of concrete protection in the recent fire, which were published in the SCIENTIFIC AMERICAN of June 9, 1906, and which Mr. Fitzpatrick criticises as giving a one-sided and misleading impression of the facts. The article, which is too long for the columns of the SCIENTIFIC AMERICAN, will be found in the current issue of the SUPPLEMENT. The illustrations consist largely of interior views of columns, girders, floors, and partitions which were affected by the fire, and they are from photographs selected from several hundred made under expert supervision at San Francisco. The article is an impartial and very thoughtful review of the lessons taught by the disaster as to the design and construction of future fireproof buildings.

PROF. SEE'S INVESTIGATION OF THE EARTH'S RIGIDITY.

In the Astronomische Nachrichten Prof. T. J. J. See, U. S. navy, has exhaustively investigated the rigidity of the earth and other heavenly bodies, by mathematical processes depending wholly on the theory of gravitation.

This line of investigation was begun in 1863 by Lord Kelvin, who sought to determine the rigidity of the earth from observations of the tides of the oceans. Tidal observations secured the only means of ascertaining the amount of bodily distortion experienced by the earth under the disturbing forces of the sun and moon; and it was thought that if the earth proved to be highly rigid, the result would contradict the theory long held by geologists that the earth is a globe of molten matter inclosed in a thin crust, like the shell of an egg.

Lord Kelvin reached the conclusion that the earth as a whole is certainly more rigid than glass, but perhaps not quite as rigid as steel.

About 1880 Sir George Darwin took up the investigation, and considerably extended and improved Lord Kelvin's method. By careful study of the fortnightly tides he found the earth to be more rigid than steel; that is, it yielded less under the disturbing action of the sun and moon than a solid globe of steel of the same size. This was justly held to show that our earth could not be a sphere of liquid covered by a thin crust; and geologists had to conform their theories with a globe as rigid as steel.

Prof. See's investigation is purely mathematical, and based on the pressure existing throughout the earth. According to Laplace's law, the density at the center of the earth is equal to that of lead, and the pressure equal to that exerted by a vertical column of quicksilver as long as the distance from St. Louis to San Francisco.

By considering the pressure throughout the whole earth, it is found that even if fluid, our globe would have a rigidity greater than that of wrought iron. The earth's matter under this great pressure acts as a solid, and so vibrates in an earthquake; and the average rigidity of the whole mass is nearly equal to that of nickel steel, such as is used in the armor of a battleship. Nickel steel is one of the strongest and hardest metals known, and it affords us a good idea of the strength and rigidity of the earth. Our globe is thus proved to be capable of withstanding enormous strain; and we need have no fear that earthquakes or volcanic outbursts will ever endanger its stability.

Dr. See proves that the rigidity of the earth's crust is about equal to that of granite, which is one-sixth that of steel; and that toward the center the rigidity rapidly increases. At the earth's center the imprisoned matter is at an enormously high temperature, yet under the tremendous pressure there at work, it is kept three times more rigid than the nickel steel used in the armor of a battleship.

His new method can be applied also to the other planets. Heretofore no method has been known for finding the rigidity of any mass except the earth on which we live. But the gravitational method can be applied with entire confidence to Venus, Mars, Jupiter, or Saturn, and we can find their rigidity almost as accurately as we can that of our own globe.

It turns out that the rigidity of Venus is greater than that of platinum, and most likely about identical with that of wrought iron. The rigidity of Mars is about equal to that of gold, while the rigidity of Mercury, the moon, and other satellites is about equal to that of glass.

The average rigidity of the great planets, Jupiter, Saturn, Uranus, and Neptune, lies between eighteen and three times that of nickel steel. The great rigidity of these bodies is due to the great pressure acting throughout such large masses. In the case of the sun the result is still more extreme. The average rigidity of all the sun's layers is over two thousand times that of nickel steel.

This result affords a good idea of the effect of gravity in compressing and hardening a mass, even when it is self-luminous and at enormously high temperature.

Having shown by laborious calculation that these bodies are so rigid, Prof. See has gone one step farther, and inquired what effect this rigidity will have on the currents often supposed to circulate within these masses. As pressure directly increases the fluid friction of moving currents and tends to bring them to rest, it is not surprising to find that the rigidity almost prevents circulation, especially deep down in these masses.

Many geologists have held that liquid currents exist in the earth; and astronomers have been accustomed to assume that fluid currents in the sun descend almost to its center. In view of these results, it is not surprising to find that he denies the possibility of currents in the earth, and claims that currents in the sun and great planets must all be quite shallow.

These currents cannot descend to any appreciable depth, because the pressure and rigidity are too great. In the case of the earth, we cannot well conceive of currents in matter more rigid than granite; and in the case of the sun, a rigidity twenty-two times that of nickel steel only one-tenth of the way to the center makes circulation of currents below that depth likewise inconceivable.

DISCOVERIES IN THE SARGASSO SEA.

There is a sea in the middle of the very ocean itself, the limits of which are as well defined as those of any other known large body of water; its characteristics are so peculiar, too, that it is impossible for anyone to mistake them. The first glimpse Columbus had of this sea reminded him, so it is said, of an "undulating meadow"; as far as the eye could reach, the sea was covered with a greenish yellow plant, just as completely as water lilies do a pond. Ever since that day when the immortal Christopher first saw the weed, and doubtless for thousands of years before then, the Sargasso Sea (for such is the name of this strange body of water) has existed. Its boundaries may be indicated by tracing a triangle, the three corners of which are represented by the Azores, the Canaries, and Cape de Verde. Within these limits the surface of the sea is covered with so thick a coating of seaweed as to prevent vessels from sailing through it. Steamers also avoid it, whenever possible, because of the fouling of their screws and paddles by the weed.

During the course of 1905 H. R. H. Prince Albert of Monaco sailed for this sea in his famous vessel, the "Princesse Alice," with three objects in view, viz., the study of bathypelagic faunas in general, of the faunas of the Sargasso Sea, and of the meteorology of the upper atmosphere. The vessel sailed from Marseilles on July 20 and returned on September 24, 1905. The results of the 64 days' voyage have recently been published, and form highly interesting reading.

No less than 118 soundings were made up to a depth of 5,580 meters (18,302 feet) and 28 samples of water were taken in Richard bottles and Buchanan tubes. Some very interesting zoölogical finds were made, of which the following is a brief description. With a bag-net there were secured (at depths ranging from 606 to 11,364 feet) numerous Alcyonariæ, several interesting crinoids, and two extremely rare specimens of *Gephyrocrinus Grimaldii*, already discovered by the prince on a previous occasion. Among other crustaceæ there was a specimen of the *Polycheles eryoniformis* Bouv., a new species which recalls the Jurassic eryon by its dilated carapace. Another net, sunk to a depth of 11,364 feet, brought up a rich find, comprising a new type of *Cinroteuthis* of a uniform black color, with large black brachial papillæ; a small Cephalopod, of an undoubtedly new type and species, having telescopic eyes and an extremely singular trilobial luminous organ. By far the most productive accessory of the campaign was found to be a wide-mouthed vertical net; in fact, adequately to describe the numerous specimens secured with its aid would require a booklet. Forty-one descents were made, to a depth of 17,712 feet, and, in most cases, the specimens obtained were similar to those obtained in the course of researches made a year ago elsewhere. The most striking objects were a new Ulmarida of the color of wine lees, closely related to the Aurelia, and constituting the first member of this family found in deep waters; of the Ostracod family there were some large spherical *Gigantocypris*, and several specimens of a large black (or almost black) Ostracod, the shape of which may be likened to the pip of a ripe pear, several relatively speaking new species of Nemertæ, especially a large orange-colored variety, hitherto rarely found among bathypelagic fauna; and finally some transparent Annelidæ with large red eyes, and several types of Phronima, one entirely new. In the Sargasso Sea the net also brought up one of those curious crustaceans of the Eryoneicus type; it is quite new, and M. Bouvier,

member of the Oceanographic Institute (who accompanied the expedition, together with Dr. Richard, director of the Monaco Oceanographic Museum, and other equally distinguished gentlemen) has christened it the *Eryoneicus Alberti*.

The fauna inhabiting the Sargasso Sea was studied on the surface, between the latter and the bottom, and on the bottom itself up to a depth of 11,364 feet. A numerous but sparsely varied fauna lives amid the weed covering this sea; it comprises Actiniæ, Ascidiæ, Nudibranchiæ, Crabs, Isopods, and a few pelagic animals clinging mostly to the surface of the weed. Mimicry is a very marked feature of animal life in the Sargasso Sea. A new species of pelagic Holothuria was found, and there were captured on several occasions many specimens of a curious hemiptera (*Halobates Vüllerstorffi*) which jumps about on the surface of the sea.

An interesting item of the voyage was that (when in the Sargasso Sea at a distance of 840 miles from the nearest continent) the "Princesse Alice" was visited by five swallows of the American variety called *Hirundo rustica erythrogaster*, Bodd. A remarkable feature of the whole region comprised between the tropics, the continent of Africa, and the Azores, is the almost total lack of any animal life on the surface of the sea. No cetaceans or marine birds were met with; flying fishes and the Plankton were the sole redeeming features in a dreary and silent waste of waters. A curious double lunar rainbow was seen on one occasion (August 28, 1905), and was painted by an artist accompanying the expedition. The curious phenomenon known as the "Green Ray" was also often seen.

ELECTRICITY AND MATTER IN A GASEOUS STATE.

BY PROF. EDGAR L. LARKIN.

When Newton announced the law of gravity, the effect must have been akin to the discovery of radium in our own time. Really, a rapid wave of expanding science spread over the world, and everybody talked about the mystery of all time, gravity. What has happened? If a newly discovered law equal to that of attraction should now be telegraphed to every scientific body in existence, would a scene of animation and activity set in? Or, have discoveries "followed fast, and followed faster" of late than can be assimilated? Or, would the discovery of what gravity is, or matter, or mind, occasion more than a few remarks on a street corner, about the passing wonder?

Ionization and conductivity are equal to gravity. They form two granite and hewn stones round about and under nature. If the actual gravity is ever explained, the explanation must and will be found hidden in these. All scientific men were filled with admiration—yes, hidden adoration—for Newton, when the Principia appeared. But another Principia is here—a book, "The Conduction of Electricity Through Gases," by Prof. J. J. Thomson. To the writer, it is as a basic Principia, upon which can be erected a vast, new, and comprehensive view of all that part of the universe known to man. Since Newton, literatures of science have teemed with the sentence: "Inversely as the square of the distance." But a new term or sentence is now appearing in scientific literature of the highest type. Here are quotations: "The saturation current between two parallel plates of given area depends upon the amount of the ionization that takes place throughout the whole volume of gas between the plates, then the greater the distance between the plates the greater is the saturation current, so that if we use constant potential differences large enough to produce saturation, the greater the distance between the plates the larger is the current. Thus the behavior of the conducting gas is very different from that of a metallic or liquid electrolytic conductor; for if such conductors were substituted for the gas, the greater the distance between the plates the smaller would be the current." And: "The peculiarities shown by the conduction through gases are very easily explained on the assumption that the conduction is due to ions mixed with gas" (p. 13, Thomson). And another: "The condition essential to stability in chemical combination is, 'The attraction of one atom to another (or others) increases as the distance increases'" (Berisford Ingran, Knowledge, April, 1905, p. 75). Since science began, there have not appeared more important discoveries or wisdom. While heat, light, gravity, magnetism, and electricity, when in the form of circular waves, vary in intensity inversely as the square of the distance, electricity, while traversing ionized gases as a "current," increases in quantity as the distance increases! This surely is because it gathers up ions on the way from one mass of matter to another, that is, takes up electricity. If the masses are two suns forming in space, from primordial gas, ionization allows colossal quantities of electricity to circulate from sun to sun, whether two or two trillion. And this brings the writer of this note to the point of starting, for during many years we have advocated, in season and out, the electrical basis of the universe. On page 8 Prof. Thomson says: "The electrical conductivity of gases in the normal state is so small that, as we have seen, the proof of its existence requires very careful and elaborate experiments." Then he gives several ways of making excessively rare gases conducting, thus: Draw them from the neighborhood of flames, or from electric arcs, or from glowing metals; but far better is to allow Röntgen, Lenard, or cathode rays to pass through them, or rays from uranium, radium, polonium, thorium, and ultra-violet light to traverse and ionize. Thus two metallic plates may have rare gas between them, and electricity would have difficulty in forcing a passage. Now ionize the gaseous particles, i. e., separate them into corpuscles, and electricity will "flow" from positive to negative with slight resistance, and external rays from any radio-active substance are able to ionize. It is almost impossible to resist the temptation to apply the new laws to cosmological processes in primitive conditions of matter. This primordial state was without doubt gaseous. Perhaps dissociation reigned. At all events, the mechanics of liquids and solids did not act. Finer forces, radio-active energies, and activities wrought for ages before gravity wheeled worlds into revolving systems. Let two suns be, say, within 25 trillion miles of each other. The space between, if filled with normal gas, would offer high resistance to transmission of electricity. Let rays from radium or any electrostatic field shoot across the intersolar gases at right angles and ionize them; then vast flows of electricity would take place from sun to sun. There was a circulation throughout the universe then, as well as now. The entire structure of nature is a living unit. It has a pulse. All matter by hypothesis was once ultra-gaseous. It therefore obeyed laws able to act on matter in that state, and no others. Every one of the laws is electrical.

Deviation of rays is a stupendous fact, deep-seated and far-reaching. From a study of the bending aside of rays in laboratories, imagination can easily carry back to primordial cosmical times. Radium emits alpha, beta, and gamma rays and many others besides. Magnetism is able to turn alpha rays one way and beta the other. The fact stands out that they are separated. Gamma rays cannot be bent out of their original straight lines. To begin gravity, matter must be charged with electricity. Of course, this is a "working hypothesis." This is the way to do it.

Let vast masses in space, like the nebula in Orion, or like the giant suns Antares or Canopus, be radio-active, and let floods of rays pour into space—for a frigid nebula or a hot sun can be radio-active.

Let an enormous mass be, as it were, an electrostatic "field" in space many million miles away. Electrostatic fields attract and repel precisely like a magnet. Floods of alpha, beta, and gamma rays attempt to pass in front of this field. Let a stream of alpha rays be separated out and be deviated to one side. Let them strike a world in process of formation. It will instantly be positively electrified. And another electro-magnetic or static field can deflect beta rays upon other worlds, and charge them negatively. Charges are thus set up daily in physical laboratories; why not in space? Radio-active rays are absorbed by matter with great avidity. But these rays must be electric, else they could not be diverted by magnetism. At present, it is not known what effect gamma rays have when they hit a forming world. For world building has not ceased. Another cosmical worker is induced radio-activity. An active nebula or sun can establish activity in others at a distance. It is a common thing to charge suspended insulated spheres by induction electrically in every laboratory. Suns may differ actually in their phases of matter, as much as their spectra. Thus let a nebula in space at the absolute zero of temperature be composed of corpuscles—bodies smaller than the chemical atom—in dissociation.

Let alpha rays only be deflected upon it for a million years, and let beta rays fall on another nebula; then the phases of matter produced would no doubt differ. The suns condensed from them must be unlike and project differing spectra. From the vast mass of literature received on this mountain peak, it appears that the entire scientific world is going the radio-active way. And well it is, for radiant energy, in the forms of alpha, beta, gamma, Röntgen, Becquerel, and doubtless a hundred other kinds of rays, together with deflection, induction, catalysis, "acting at a distance," and ionization—these all, and surely others not yet discovered, were and still are the cosmical builders, workers, and carriers. When Crookes lighted up his low-pressure tubes he opened the gates of a world more inscrutable than that of Hermetic mysteries. And a science of boundless ramifications into every nook and corner of nature is founded and grounded on Prof. Thomson's classic book. Electricity can start from one sun to go to another. If electro-active fields are passed, then the primitive gas is ionized, and the original quantity gathers more as it flies and pours a larger flood on its neighbor. It does not weaken as the squares of the distances increase. This is absolutely new in science, is revolutionary in character, is literally true, and will overthrow all existing cosmological theories. Soon it will be admitted that electricity exists in a practically infinite number of modes and forms, ordinary "currents" and "charges" being common-place. In a few years it will be fashionable to say that a cubic inch of iron and another of water contain equal quantities of matter; since both are nearly incompressible, and that the reason why iron tends toward the center of the earth with a force 7.8 times that of water, is because it contains 7.8 times as much electricity.

Lowe Observatory, Echo Mountain, Cal.

THE DESCENT OF MAN.

Kollmann, the professor of anatomy, has recently written an exhaustive article on the subject of the relationship between man and the *Pithecanthropus erectus* of Dubois. It will be remembered that some years ago Dubois discovered in the island of Java some bones, the femur and several bones of the cranium, which resembled both the corresponding bones in the human frame and also in the frame of a monkey. This discovery was much talked of, since it was thought that in these bones had been discovered portions of a prehistoric animal, which might have formed the so-called missing link in the chain of descent of man from monkey. It was the scientist Schwalbe who, in accordance with this idea, christened this hypothetical animal with the name *Pithecanthropus erectus*, or man-monkey standing erect. A minute examination of the bony remains of Java permitted the hypothesis that they had belonged to a being of great stature, with habits still arboreal, and which probably passed a great part of its time in the trees, but which, like man, already possessed the faculty of speech. But Kollmann now shows that although these bones discovered in Java are of great paleontological importance, they should be interpreted in quite a different manner. He asserts that the animal to which they belonged could not have been a precursor of man, for, although they certainly belonged to one of the most highly developed of the anthropoid apes, its habits and customs could not have differed from those of its cousins still living, the chimpanzee, the gorilla, the orang-outang, all species of animals which have reached the extreme limit of their variability. Kollmann is rather of the opinion that the direct antecedents of man should not be sought among the species of anthropoid apes of great height and with flat skulls, but much further back in the zoological scale, among the small monkeys with pointed skulls; from these he believes were developed the human pygmy races of prehistoric ages, with pointed skulls, and from these pygmy races finally developed the human race of historic times. In this manner may be explained the persistency with which mythology and folk lore allude to the subject of pygmy people, and it would also explain the relative frequency with which recently the fossils of small human beings belonging to prehistoric periods have been discovered.

THE DEATH OF DANIEL B. WESSON.

After a long illness Daniel Baird Wesson, the rifle and revolver maker, died at Springfield, Mass., on August 4.

Born in Worcester, Mass., Mr. Wesson was the founder of the firm of Smith & Wesson. He went to Springfield a poor man, but died immensely wealthy.

He was the inventor of the cartridge with a percussion cap. In 1883 he formed a partnership with Horace Smith, of Norwich, Conn., and there worked out the principles of the Winchester rifle. He first put into use the self-primed metallic cartridge, used during the civil war. About the same time he succeeded in perfecting a revolver, the principal feature of which was that the chambers ran entirely through the cylinder.

Mr. Wesson was also the inventor of several other improvements in firearms, the most important of which were the automatic cartridge shell extractor and the self-lubricating cartridge. He also introduced the hammerless safety revolver.

It is reported that the Canadian Pacific Company has decided to await the outcome of experiments by the New York Central and New York, New Haven & Hartford Railway Companies before taking steps for the electrification of any part of its system. Both the latter railways are spending enormous sums upon experiments, the former with a direct and the latter with a single-phase alternating current. The line from Montreal to Quebec will in all probability witness the first installation. All the electric power necessary can be obtained from the Shawinigan Falls.

Efforts are being made, by constructing embankments, to improve the channel at Rouen and keep it to one course, the present difficulty being that the channel is constantly shifting. Plans are now under consideration for the lengthening of the embankment on the left side of the estuary, and for the construction of embankments on both sides of the same to confine the channel to certain limits between Val de la Haye and Biessard.

THE RACE FOR THE KING'S CUP.

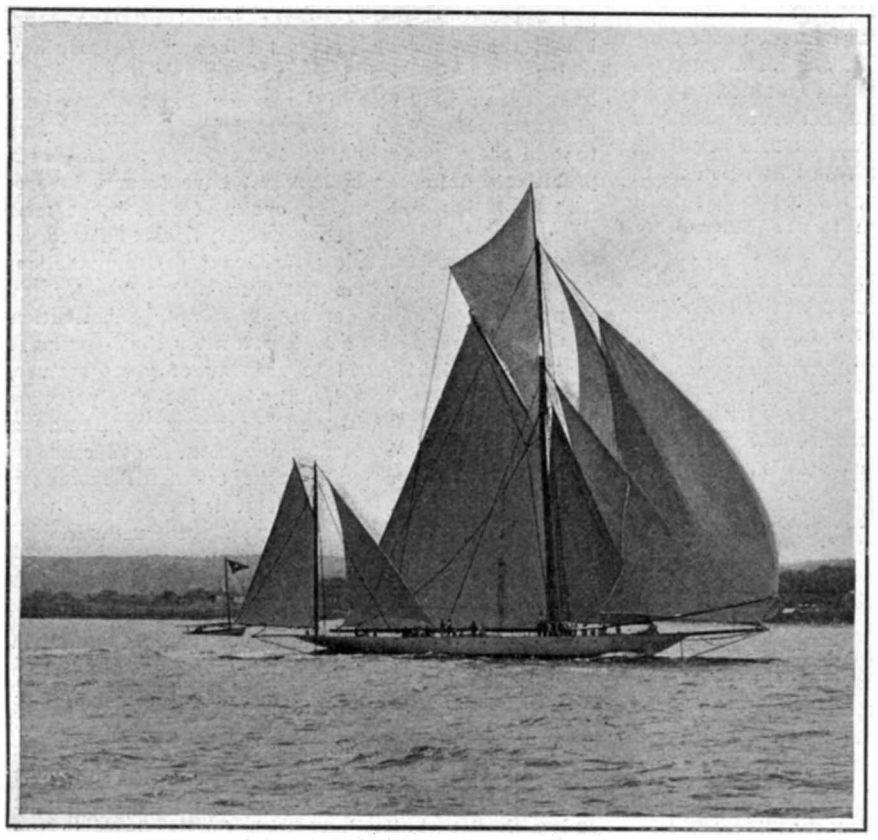
The first race for the $5,000 gold cup presented by King Edward VII. to the New York Yacht Club as a challenge cup to be raced for annually, took place on Wednesday, August 8, off Newport. In point of interest and importance this event compares with the famous races which have been sailed off Sandy Hook during the past half century for the famous America's cup. Ever since it was announced that the new yachting trophy had been offered and accepted, a large number of prominent yachtsmen have been directing their efforts toward the much-coveted distinction of having the name of their yacht inscribed on the cup as the first winner thereof. Practically all of the fastest of the American yachts, or at least those of them which were supposed to have any chance of success, were put into commission this year; and they have been tuned up into first-class condition by following the racing circuit throughout the season. Moreover, two out-and-out racing yachts were built especially to win this trophy.

As compared with the races for the America's cup, the competition for the King's cup had this decided advantage—that the yachts were built, and the time allowances calculated, under the new rule of the New York Yacht Club, which was framed with the idea of promoting the construction of a more wholesome type of yacht, with less of the "freak" about it, than those which have been turned out under the old rule governing the America cup contests. Under the latter rule, as most of our readers are aware, the yachts are rated according to the amount of sail that they carry and their length on the water-line. The result of this has been that in the effort to obtain power and speed the yachts have been built with extreme breadth and draft, and with excessive overhangs, the limit of excess having been reached in the "Reliance," which, on something less than 90 feet of water-line, had a beam of 27 feet, a draft of 20 feet, and an over-all length of about 140 feet. With nearly 100 tons of lead upon her keel, she was able to carry the enormous sail spread of over 16,000 square feet. The main object aimed at in the design of these boats was to carry a maximum amount of canvas on a minimum amount of underwater hull, or with a minimum amount of wetted surface and displacement.

The new rule of the New York Yacht Club places a heavy penalty on these extreme features, and a designer having in view the heavy penalties imposed on extreme overhangs, shallow immersed body, etc., finds that the type of boat best calculated to win the cup is one of a more wholesome form, with a deeper body, finer ends, and larger displacement. It is the hope of all yachtsmen the world over who take an interest in the America cup, that the new rule will be made to apply to the races that may be sailed in future for that famous trophy. If it should be, there is no question that challenges will be sent in and yachts will be built which, after the races are over, will, because of their seaworthy qualities, be serviceable for racing, and even cruising for many years to come.

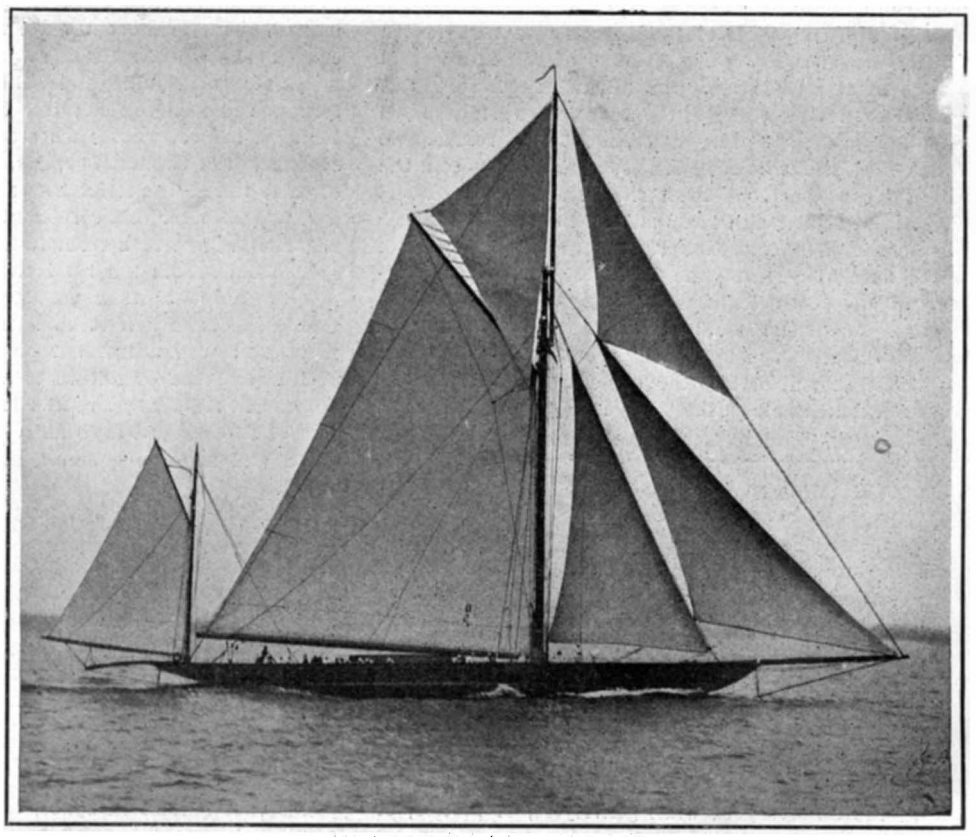
Of the nine yachts which started for the King's cup, two, the schooner "Queen" and the sloop "Effort," were built this season especially to compete for the cup; and it is significant that these two were first and second in the race, which was won by the "Effort" on time allowance, with only nine seconds to spare. The "Queen" is a keel schooner with an auxiliary centerboard, built of steel, and designed by Nat Herreshoff for J. Rogers Maxwell. She measures 90 feet on the water-line, 126 feet on deck, 24 feet beam, and draws 14 feet 10 inches of water. She spreads 11,000 square feet of canvas. She has been sailed steadily through all the important races of the present season, and is decidedly the fastest yacht afloat this year in these waters. What she would do against the modern single stickers, built under the old rule, is problematical; although from the decisive way in which she defeated the "Vigilant," now sailing as a yawl, it is quite possible that in a fresh breeze she could save her time allowance on such yachts as "Constitution" and "Reliance." The "Effort" is a bronze sloop designed this year by H. J. Gielow for F. M. Smith, and built by Robert Jacob at City Island. She is 65 feet on the water line, 93 feet 3 inches on deck, 16 feet 6 inches in breadth, 6 feet 9 inches in depth, and draws 11 feet of water. She is an out-and-out racing sloop, with steel frames and bronze plating, and throughout the season has done some excellent racing against those other bronze boats the "Weetamoe" and "Neola," the former of which, although four years older, has proved a very worthy opponent, winning several races against the new sloop. The "Weetamoe," which, much to the regret of yachtsmen, was one of the yachts entered for the race which did not cross the line, is 56 feet on the water-line, 89 feet 6 inches on deck, 16 feet 6 inches in beam, and draws 11 feet 6

(*Continued on page* 114.)



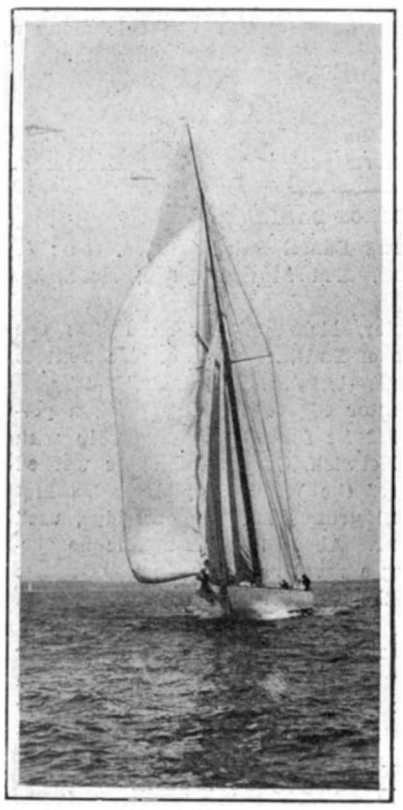
Length on Water-line, 86 feet 3 inches.

Yawl "Vigilant." Sixth Position



Length on ater-line, 90 feet 6 inches.

Yawl "Sybarita." Entered But Did Not Race.

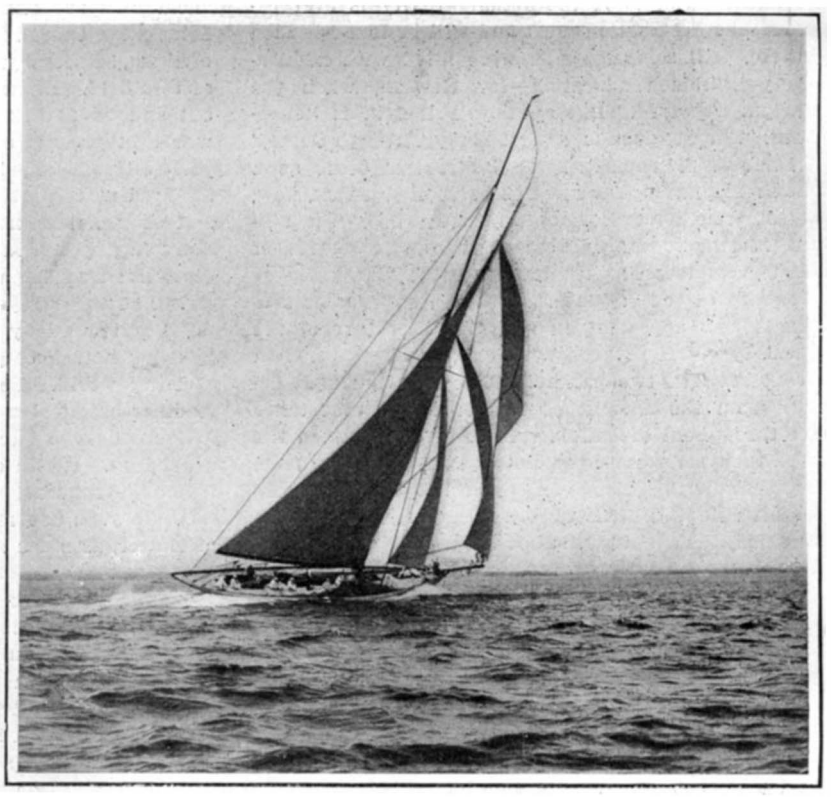


Length on Water-line, 70 feet.

Sloop "Rainbow." Disabled.

Length on Water-line, 56 feet.

Sloop "Weetamoe." Entered, Did Not Race.



Length on Water-line, 70 feet.

Sloop "Yankee." Fourth Position.

CRUISE OF THE NEW YORK YACHT CLUB.—COMPETITORS FOR THE KING'S CUP.

THE ELECTRIC CAR EQUIPMENT OF THE LONG ISLAND RAILROAD.

BY W. N. SMITH.

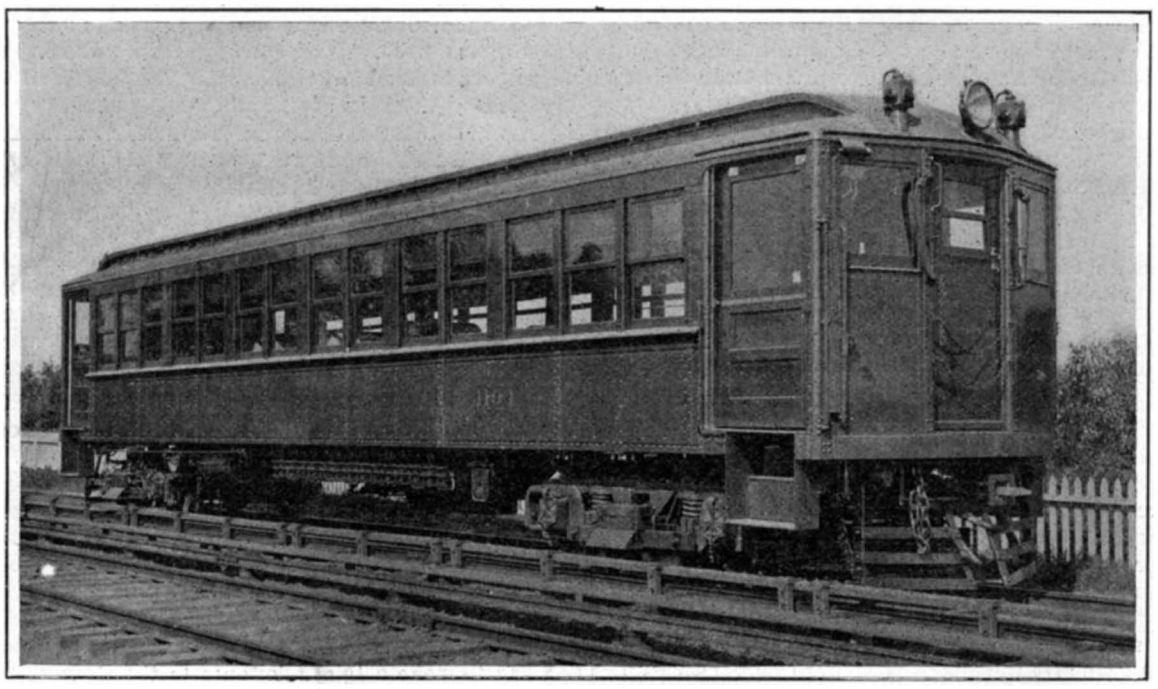
The design of the car equipment of the Long Island Railroad is based upon a careful study of the traffic conditions as they were outlined by the railroad officials at the commencement of the undertaking, calling for trains with the number of cars varying from two to six per train at different hours of the day in regular operation, while heavy excursion travel to the beaches and racetracks would, occasionally, require trains of ten or twelve cars. Some of the service is express and some local. It was deemed of the greatest importance to provide a single type of equipment that would be uniformly available for all the varying conditions of train service.

The maximum possible speed for express runs can be made when all the cars of a multiple-unit train are motor cars. Ordinary schedule conditions, however, usually permit a portion of each train to consist of trailers, and the most severe conditions of frequent stops can be met if the proportion of trailers is not more than one trailer to two motor cars. A considerable saving in the weight of the entire train is thus possible without exceeding either the tractive power of the motors or their ability to radiate the heat developed by the frequent accelerations which are the severest tax upon their capacity.

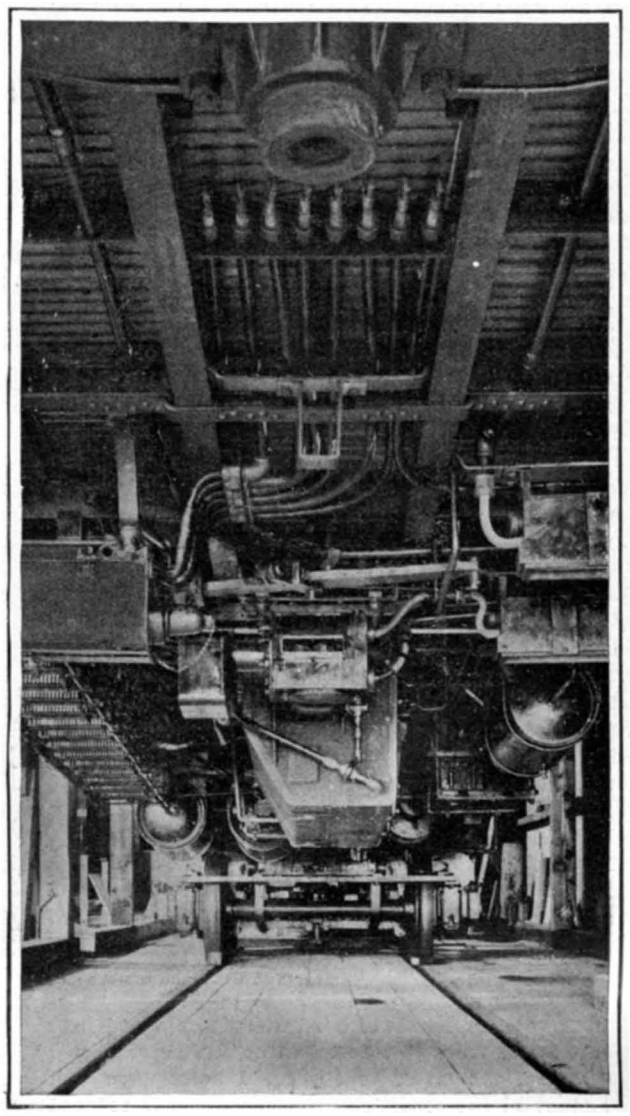
The fact that the Atlantic Division is partly in a subway and the need for interchangeability with the rolling stock of the Interborough Rapid Transit Subway has much to do with the design of the cars. The complete success of the first all-steel passenger cars ever built, and which were designed by Mr. George Gibbs of the New York Subway, led him, in his capacity of Chief Engineer of the Long Island Railroad electric conversion, to advocate their use on this road as well. To the Interborough Rapid Transit Company and the Long Island Railroad Company belongs, therefore, the distinction of being the first railroads in the world to adopt this radical departure in car construction, thus insuring to the public complete immunity from the danger of fire in cars equipped with apparatus carrying powerful electric currents.

The standard third-rail shoes on the Long Island cars are of the hinged slipper type supported on the usual wooden beam which is clamped against the notched face of the equalizer spring seat castings, providing means for vertical adjustment. Trains from the Brooklyn Rapid Transit Company's elevated lines operate over the Atlantic Avenue and Rockaway Beach Divisions by way of Chestnut Street Junction to Rockaway Park. The Brooklyn Elevated line has been for some years operated by the third rail, but the location of the rail is 22¼ inches outside and 6 inches above the track rail, while the Long Island Railroad third rail is 26 inches out and 3½ inches up. This made it necessary to devise some form of adjustable third rail shoe which would operate with equal facility over both third rails and be able to change from one to the other at reduced speed without requiring attention on the part of the motormen or train crew. Such an arrangement has been worked out and patents on it have been applied for by Mr. James C. Boyd. It consists essentially of a hinged slipper type of shoe, mounted upon a movable lug which is held in either position by means of coil springs and is actuated by an arm that engages with the stationary cam mounted alongside of the track in line with the third rail. The movement of the car past this cam in one direction changes the shoe from the inner to the outer low position, while a reverse movement of the car past the cam changes it from the outer to the inner raised position. These adjustable shoe equipments have been fitted to such cars of the Brooklyn Rapid Transit Company as are to operate over the lines of the Long Island Railroad.

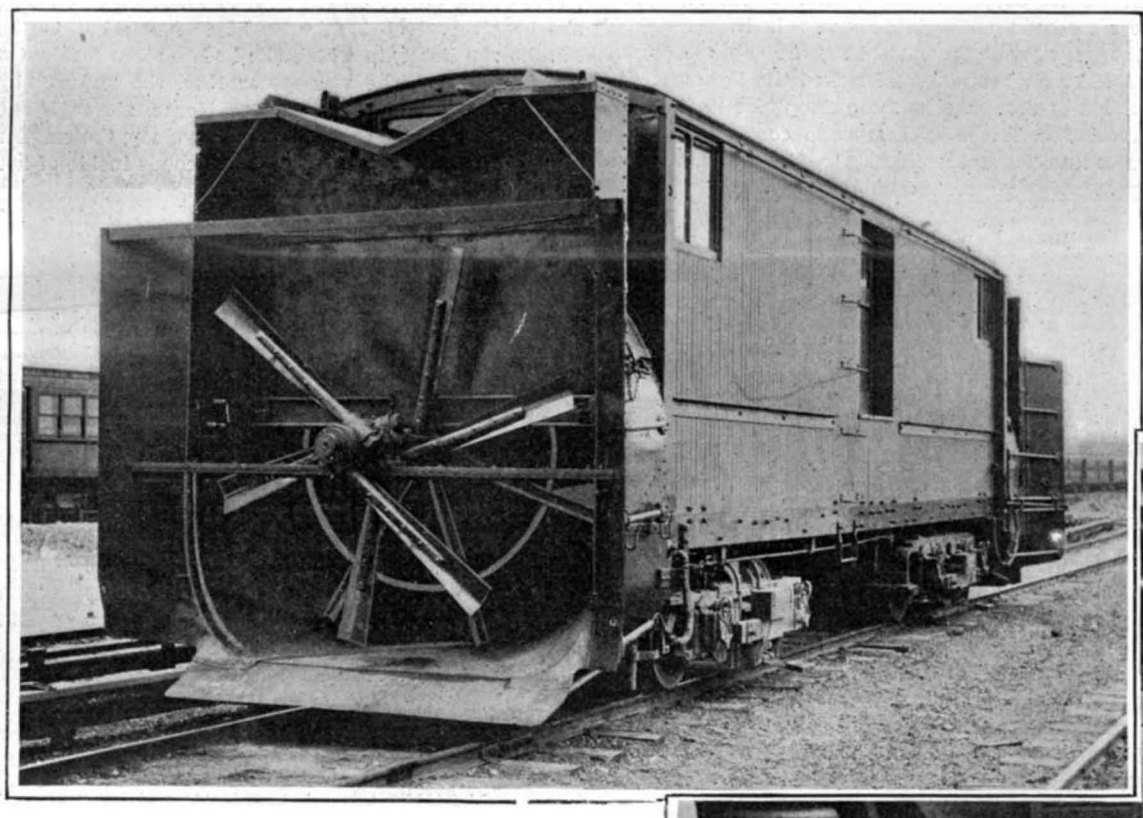
The cars are equipped with hand brakes and with the improved Westinghouse quick service automatic air brake. The quick service application is obtained by venting the train pipe air into the brake cylinders,



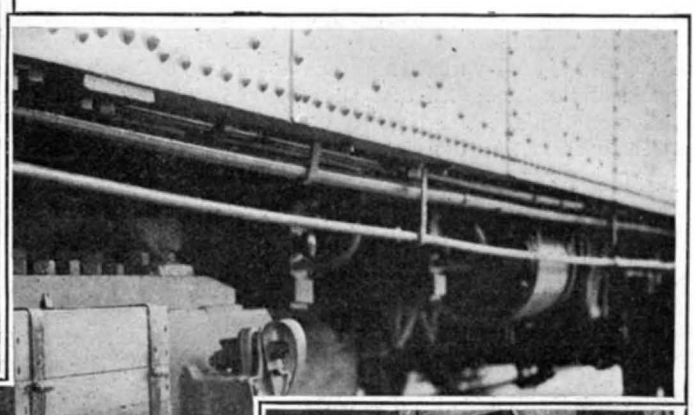
All-Steel Car Used on the Long Island Railroad.

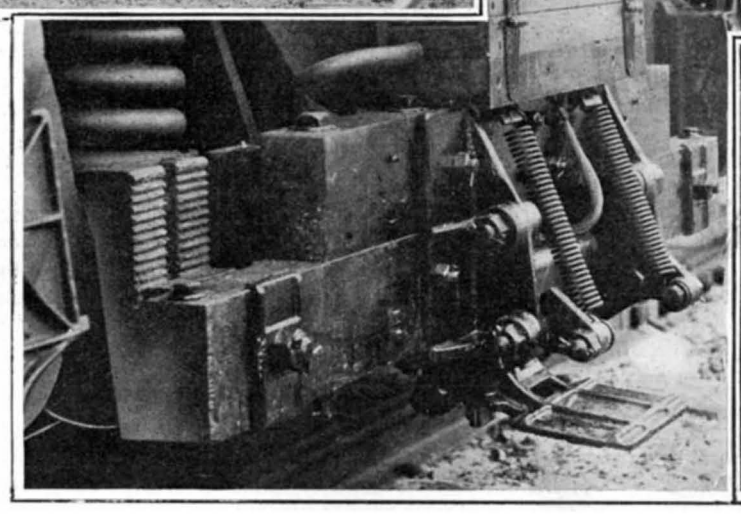


A Motor Car as Viewed from Underneath.

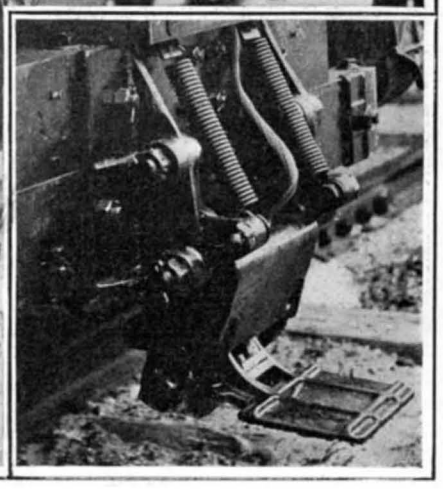


One of the Snow Plows.





Adjustable Third-Rail Shoe in Inner Position.



Outer Position.

THE ELECTRIC CAR EQUIPMENT OF THE LONG ISLAND RAILROAD.

in each service application, in the same way as is done in the quick-acting brake in emergency. The time required to fully set the brakes in service is, in this way, reduced approximately one-half, as compared with the usual apparatus. The cylinder pressure can also be gradually reduced by any desired amount just as with the old straight-air system. This is made possible by a special arrangement of ports in a triple valve and a partial release of the air from the cylinder is effected by slightly raising the train pipe pressure through the motorman's brake valve. The quick-charging of auxiliary reservoirs is done by providing an additional supply port in the triple valve connecting the train pipe on each motor car with the main reservoir through the feed valve. When the brakes are released the train pipe and auxiliary reservoirs are supplied from all the main reservoirs of the train, thereby permitting the auxiliary reservoirs to be charged at the rate that makes it practically impossible to deplete the effective pressure as long as the main reservoirs are supplied by the compressors.

The selection of the electrical equipment of the motor cars, whether operated singly or in trains, requires the most careful study of the loads to be handled, the schedule conditions under which the apparatus is to be operated, and the limitations of the apparatus itself. Whether all cars of a train should be motor cars; whether all axles of the motor cars should be equipped; what the motor characteristics, the ratio of gearing, and the wheel diameter should be; the maximum speeds that could be depended upon to make up time, and the amount of time to be allowed for "lying over" at terminals were, among others, considerations of the utmost importance in coming to a decision on the equipment that would most economically serve the purposes of the Long Island Railroad suburban lines. The variable number of motors and trailer cars per train caused some variation in the load per motor on different trains. There were also various classes of express and local service to deal with involving different schedule speeds and average lengths of runs between stops, for all of which it was desirable to provide a uniform equipment, so that any car could be devoted to any desired type of service without discrimination. Careful investigation showed that the greatest flexibility would result from two-motor car equipment, using the most powerful motors practicable. The limitations were mainly the dimensions imposed by the largest trucks that could be operated under the conditions prescribed by the tunnel and curve clearances which restricted the wheel base of the motor truck to 6 feet 8 inches. This restricted the size of the motor to about 200 horse-power and the study of the conditions was consequently reduced to an examination of the characteristics and gear ratio most suitable for this motor and of its power of endurance to resist overheating. At the outset a series of speed tests was made on various steam trains of the Long Island Railroad in order to compare the actual running time with that laid down in the time tables and with the times which the railroad officials desired to be met by the electrical equipment. An ordinary passenger coach was fitted with speed-recording devices, and a number of speed curves were obtained. These tests also threw some light on the time to be allowed for various delays to which the trains were likely to be subjected, and, together with the actually derived speed curves and calculated best performance curves, showed the relation between the schedule time ordinarily allowed for a train on a given run, and the best time that it could possibly make over the same distance. An idea of the scope of the problem may be had from the statement that there had to be compared about twenty-three different types of train runs, local and express, on eight different routes, with the average distance between stops different in practically every case.

The work of determining the equipment of any system, particularly one so extensive and interconnected as that of the Long Island Railroad, begins, therefore, with the railway motor performance as the principal starting point, and when the train requirements have been worked out carefully the determination of the rest of the equipment is a matter of detailed computation. The general fitness for its work of the equipment actually selected, as proved by the operating results, has justified the care that was taken to work out the problem in a consistent and logical manner.

The motors are of the Westinghouse type, both mounted on one truck. The cast steel frame is split at an angle of 45 degrees, horizontally, the axle bearing being in the lower half. The armature can be taken out without removing the motor from the truck by lifting off the top half of the frame, or the motor can be lifted entire from the truck by removing the gear case and axle caps. A nose suspension with safety lugs which engage with the truck transom is employed for this motor. Access to the brushes and brush holders is provided through an opening in the frame over the commutator, which extends down well over the axle making it easy to inspect the motor from the pit. The commutator cover is perforated, and openings in the bearing housings at the pinion end provide for ventilation, which is practically effected by air being drawn in at that end and thrown out through the ventilating cover over the commutator, forming a continuous draft through the motor.

The Westinghouse electro-pneumatic multiple control system was adopted for the cars of the Long Island Railroad. The advantage of air pressure as an actuating force for making and breaking switch contacts is that it permits an application of considerable power at the contact with relatively light and simple means consisting simply of a piston working in an air cylinder making contact by air pressure and breaking it by a powerful release spring when the air is exhausted. Contact is thus made certain and welding is prevented at the contact points with the very heavy operating currents that have to be carried. The use of storage battery currents for controlling the main switches removes the necessity for using line current at 600 volts in the control system, and further, relieves it from any bad effects that can result from a fluctuation of the potential on the system. The automatic feature of operation is of importance in securing a regular progressive action of the switches independently of the manner in which the motorman may handle the controller, or of any accident that may happen to the train line. The switches are moved only in a certain predetermined manner through a system of interlocks, and the operating current is limited to a certain predetermined amount insuring a rate of acceleration that is automatically kept constant, which results in maximum comfort to the passengers and a minimum of wear and tear.

THE RACE FOR THE KING'S CUP.

(*Continued from page* 112.)

inches. We give these dimensions for comparison with those of "Effort" to show, in a rough way, the effect of the new rule; for, although the "Weetamoe" is 9 feet shorter on the water-line than the "Effort," she has the same beam and 6 inches more draft.

Another new yacht that sailed for the cup, although she was built for cruising and lacked the lightness of construction of the racer, was the sloop "Irolita," built by Herreshoff. She is of composite construction, 65 feet water-line, 90 feet on deck, 18 feet beam, and 9 feet draft. She carries a centerboard for windward work.

There were altogether seventeen entries for the King's cup, and they ranged from the old cup defender "Vigilant," now rigged as a yawl, with a rating, under the new rule, of 92.20, down to the little sloop "Boris," with a rating of 48.40. That only nine out of the seventeen should have started is greatly to be regretted, for where all the yachts entered, as in this case, are the work of well-known designers and are properly handled by skillful skippers, professional or amateur, the interest in a race may be said to be directly as the number of entries. Moreover, the method of rating and handicapping is evidently a liberal one, and affords an excellent inducement to the smaller yachts to push through a long race of this kind and do their best to win. It is stated that the reasons that withdrawals were so many were two: first, that the day was thoroughly disagreeable; secondly, that in the rather fresh breeze that was blowing, many of the older and the smaller yachts considered that they had no chance to win. There was a time in yachting when owners were perfectly ready to cross the line in the interest of the sport, and sail their yachts for everything that was in them, even though they knew that the chances of victory were small. Moreover, it will be an unfortunate day for yachting when lowering skies and a dash of rain prove sufficient to keep one-half of our yachts at their moorings, especially on an occasion like this, when a famous trophy is to be contested for.

Of the yachts which sailed the race, the most famous, of course, is the yawl "Vigilant," a bronze boat built in 1893 to defend the America cup against "Valkyrie II." She is 86 feet 3 inches on the water-line, 126 feet on deck; her beam is 26 feet, and her draft 14 feet 5 inches. Next in historic interest to her is the "Corona," formerly the steel sloop "Colonia," built in the same year as "Vigilant" for the defense of the cup. She is 85 feet 6 inches on the water-line, 123 feet on deck, 24 feet beam, with a draft of 14 feet 10 inches. After the trial races in which "Vigilant" was selected, the "Colonia" which, as a sloop, had a tendency to make too much leeway when close-hauled, was provided with a centerboard and rigged as a schooner. For several years she has been the crack schooner of the New York Yacht Club, and only with the advent of last year's schooner "Elmina" and this year's "Queen" have her colors been lowered. The "Elmina" was built last year from the designs of Cary Smith. She is a steel schooner, 87 feet on the water-line, 125 feet on deck, with 25 feet beam and 15 feet 2 inches draft, spreading 10,000 square feet of sail. Another schooner which in her day was the fastest of her class is the "Amorita," a steel, keel-and-centerboard schooner, designed also by Cary Smith and launched in 1895. She is 70 feet waterline, 99 feet 6 inches on deck, 20 feet beam, and draws 12 feet of water. She is owned by Richard Mansfield, who was on board throughout the race. Another schooner that sailed the race is the "Muriel," a Cary Smith boat, built in 1901; 68 feet water-line, 99 feet on deck, 20 feet 5 inches beam, and 12 feet draft. The other two yachts were the famous twin 70-footers "Yankee" and "Rainbow," of composite build (wooden sheathing on steel frames) designed and built by Herreshoff in 1900. They are 70 feet on the waterline, 106 feet on deck, with 19 feet 6 inches beam and 14 feet draft. The "Yankee" was sailed by her owner, Harry Maxwell, and in this race, as in all of those that have preceded it throughout the season, this clever amateur was pitted against the veteran professional skipper Charlie Barr, who sailed the "Rainbow," which is owned by Cornelius Vanderbilt, the Commodore of the New York Yacht Club. In this race, as in many others of the season, Maxwell secured the lead over the "Rainbow." The twin sloops were making an excellent race of it when the "Rainbow" had the misfortune to strike an uncharted rock, shaking up her crew badly, and so severely straining the yacht that she had to be withdrawn from the race.

From a yachtsman's point of view, the conditions for the contest were excellent, though the day was cloudy, with showers of rain. There was an easterly wind of moderate strength, and the triangular course was adopted, giving first 16½ miles to windward, then a reach of 4 miles, and then a run home before the wind of 17 miles. The "Queen," which was sailed by her owner, J. Rogers Maxwell, took the lead soon after the start, and was never headed throughout the course. Although at times she was sailing 13 knots an hour and gained a long lead on the whole fleet, the event showed that she never pulled far enough away from the "Effort" to have the race safely in hand. She had to make a total allowance to the sloop of 20 minutes and 42 seconds. At the end of the 16½-mile leg to windward, she was 9 minutes and 10 seconds ahead of the other; on the next leg, a reach of 4 miles, she beat the sloop 3 minutes 35 seconds; but in the 17-mile run home, in which she had to allow 9 minutes and 15 seconds, she was faster than the "Effort" by only 6 minutes and 43 seconds. Hence, although she crossed the line far in advance of the sloop, the smaller yacht managed to get home just 9 seconds inside of her allowance, and take the cup. The second yacht over the line was the "Yankee," which, although admirably sailed, finished about 10 minutes astern of the big schooner. The third vessel in was the "Vigilant," and then followed the "Elmina." Next in their order to finish were the "Effort," "Corona," and "Amorita," the "Muriel" having withdrawn during the race. The summary of the race is given below:

Yacht.	Start. h. m. s.	Finish. h. m. s	Elapsed Time. h. m. s.	Corrected Time. h. m. s.
Effort	11 30 38	4 22 58	4 52 20	4 06 40
Queen	11 30 43	4 02 30	4 31 47	4 06 49
Elmina	11 33 12	4 11 18	4 44 06	4 20 35
Yankee	11 30 12	4 12 36	4 42 14	4 22 05
Corona	11 33 00	4 27 16	4 54 16	4 28 33
Vigilant	11 31 43	4 13 32	4 41 49	4 29 17
Amorita	11 31 18	5 02 18	5 31 00	4 43 27
Muriel	11 30 53	Withdrawn.		
Rainbow	11 30 25	Disabled.		

The "Effort" beat the "Queen" 9 seconds; "Elmina," 13 minutes 55 seconds; "Yankee," 15 minutes 25 seconds; "Corona," 21 minutes 53 seconds; "Vigilant," 22 minutes 37 seconds, and the "Amorita," 36 minutes 47 seconds.

The Current Supplement.

The excavation of the Pennsylvania Railroad station in New York city constitutes the subject of the opening article of the current SUPPLEMENT, No. 1598. An excellent drawing showing the scope of this vast undertaking illustrates the article. E. W. Wilgert gives some entertaining information on the first railway in America. Some good advice is published on gas-engine ignition. The last installment of Lieut. White's version of the battle of Tsushima Straits, based on information furnished him by men who took part in the battle, likewise appears. W. W. F. Pullen writes on chimney draft. Prof. Leduc has been engaged for some time in investigating the movements which occur in liquids under the influence of osmotic pressure, and the forms which result from a diffusion of the liquids in each other. The results of his experiments are described by the Paris correspondent of this journal. Some striking photographs accompany his text. Perhaps the most important article published in the SUPPLEMENT is one on the effect of the San Francisco fire on tall buildings of that city. The article is written by F. W. Fitzpatrick, a well-known authority, and discusses most exhaustively the effects of high temperature on various forms of structural material. Excellent illustrations elucidate the article. Another striking contribution is one on mosquito extermination in New York State, showing the various forms of experiments which have been used, and how marsh land has been converted into profitable farms.

Correspondence.

A Suggestion for Balloonists.

To the Editor of the SCIENTIFIC AMERICAN:

The failure thus far to construct a balloon which will not allow gas to escape through the envelope, and thus prevent a long-continued flight, leads me to relate an experience of my own in making a protection against atmospheric humidity. Several years ago there was put upon the market an apparatus for lighting gas jets, oil lamps, and lanterns by means of a strip of paper or cloth carrying pellets, which were ignited by friction, when fed under the proper pointed spring, designed for the purpose. These came out in the autumn, and before winter had passed, many were sold and considerable capital was invested in their manufacture. When the humid weather of August arrived, every one failed. The pellets, composed largely of chlorate of potash, would draw sufficient moisture entirely to put them out of commission. India-rubber varnish, copal, and shellac, all failed. Either the varnish destroyed them, or the dampness penetrated through it. Although some preparations would bear a short immersion in water, nothing withstood atmospheric humidity more than a few hours. When the makers brought the problem to me, I forthwith repeated the experiments of those who had failed before me. At last I became sure that metal alone would protect them. It required weeks of study and many failures before I succeeded. The metal must be thin and weak enough not to interfere with the explosion, and without pin-holes, like those seen in common light tinfoil. At a tinfoil factory they made for me, with little trouble, just what I needed, scarcely heavier than paper, and perfectly free from holes. To attach it to paper, I made a cement of boiled linseed oil and copal varnish in about equal parts, and to this added a very small part of a non-drying oil. Castor oil served best. The office of this non-drying oil was to prevent the cement's becoming brittle when dry. After sizing the paper, to prevent absorption, I gave it an even coat of cement, and let it dry until it "tacked," but would not flow. The tinfoil was laid upon this and rubbed or pressed until it adhered. For the purpose I was working for the pellets were printed on the tinfoil, then another sheet of foil was laid over them, in like manner. For a balloon, however, it would only be necessary to give the tinfoil a coat of cement, and when at the proper point, spread the silk, paper, or cloth, whichever was used, and rub it with a brush until it adhered firmly. After this it could be strengthened in any way that seemed best. There may be a better metal than tin for the foil, and as many as two or three layers used, for the weight is trifling. I do not believe a gas-proof bag will be made until metal is used. And this is a practicable way. Anyone who has used rubber tubing for a lamp or gas stove knows that rubber, while probably the best of the gums, is soon penetrated by gas, whatever its thickness may be. As for the durability of my product, I can only say that I have many of the strips, made eight and ten years ago, and that they are as flexible and perfect as they were when new, although no means was used to protect them from moisture or changes of temperature. I hope someone will try this way. I hold myself ready to give any further information, gathered by several years of work in this field.

DEWEY AUSTIN COBB.

Avalon, N. J., August 2, 1906.

Blowing Wells.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of July 7, 1906, page 4, you publish a short article on "The Vagaries of Wells." In Water-Supply and Irrigation Papers of the U. S. Geological Survey, No. 29, Wells and Windmills in Nebraska, Washington, 1899, our State Geologist, E. H. Barbour, describes certain wells, in substance, as follows: One class of wells found throughout a large part of the State, especially south of the Platte, deserves particular notice. These wells are known as "blowing," "roaring," "breathing," "singing," or "weather" wells. These wells are held in doubt elsewhere, but the fact of their existence is established. In some communities such wells are distinguished at a distance because of the mound of earth heaped up to check the wind. The attention of the writer was first called to this matter by inquiries for explanation of and remedy for the freezing of pipes in wells at a depth of 30, 50, 60, 80, and even 120 feet below the surface. Reports have come in from about twenty counties. The information is derived from land owners, farmers, well diggers, ministers, principals of schools, civil engineers, and students whose fathers own such wells. These accounts agree with personal observations. There are periods when these wells blow out for consecutive days, and an equal period when they are reversed. This is tested with the flames of candles and by dropping paper, chaff, feathers, etc., into the casing to see it blown out by some force, or drawn in. It is further stated that blowing often indicates high or low conditions of barometer, and that some wells blow most audibly when the wind is from the northwest, whereupon water rises to a higher level in the well than before; but when conditions are reversed, air is drawn in. Many observers notice a reverse of the current according as it is morning or evening, and according as the temperature is high or low. During the progress of a low-barometer area over one of these regions, the wind is expelled with a noise audible for several rods. Upon the following of a high-barometer area, the current is reversed. Steam rises from the curbing, melting the snow. After the current is reversed, the thawed circle freezes again. The pipes are often thawed out when the well blows. The periods of most pronounced exhalation or inhalation are coincident with exceptionally low and exceptionally high barometer areas.

He then explains the geology of the country, and draws the same conclusion as did M. Grosseteste, and continues: "The wind may be the cause in some places. At times the friction of the wind is sufficient to drive the water of the Platte across its bed, leaving the north side dry while the south side is flooded. Equilibrium is disturbed. There must be readjustment. In the vicinity water rises in wells, at a distance there is a wave of transmitted energy which can but affect every portion of the underflow of the Platte. This may show itself in a rise of water and displacement of air, and a rise over a wide area might expel a large volume of air."

I have condensed his article considerably. Almost the same article appears in Nebraska Geological Survey, vol. i., 1903. I know of several such wells near here.

RAY G. HULBURT.

Taylor, Neb., July 25, 1906.

Adulterated Food.

To the Editor of the SCIENTIFIC AMERICAN:

I read with interest an article in your esteemed issue of June 16, "The Need of a Pure Food Bill," by Charles Richards Dodge.

It is certainly gratifying to know that the pure food bill has passed the House and Senate, which proves it was neither lost, strayed, nor stolen.

The new pure food law, however, will not be of much value to the community at large unless the State laws are amended so as to conform with it. When this is done, and the law is enforced, and the public educated to the value of pure food, we will have accomplished what has long been desired.

The report made by Messrs. Reynolds and Neill no doubt hastened the passage of this most important of all subjects, the pure food bill.

According to the recent reports of the conditions in the packing houses, man is getting more than the peck of dirt it is said he is entitled to. That there is room for vast improvement in the packing houses cannot be denied, but the sensational reports should be taken with a grain of common sense.

Sensational articles claiming that hundreds and thousands of men, women, and children are dying sudden, horrible, agonizing deaths on account of eating meats that have been colored or preserved are preposterous.

There is a great deal written about tainted and embalmed meats. There could be no chemicals, however, as powerful as embalming fluids, used to preserve meat so that it would be edible. The most common preservatives that are used to preserve meats are sugar, salt, smoke, borax, and boric acid.

The United States Senate investigated the preservative question thoroughly, and after careful consideration it accepted an amendment which will allow borax and boric acid on meats, fish, fowl, etc. This I consider was a wise amendment, as by the judicious use of these mild preservatives, they will prevent meat from becoming tainted. It is the tainted meat that is in condition for the propagation of toxic germs, which are so dangerous to human health, especially during summer months.

Articles that are preserved with a mild, innocuous preservative should not be deemed adulterated. It is not the custom to adulterate food by adding something to it that will *better* its condition. Adulterated food is invariably mixed with some *inferior* substance, which reduces the food value. A preservative would enhance the food value.

When the pure food law is enforced, it will compel the manufacturers of food stuffs to label their products. The label, however, will be of no value unless the consumer peruses it and is benefited thereby. The labels will be of great benefit to those who are careful with their diet. The masses of mankind, however, are peculiar creatures. They have educated their palates to crave pickles, candies, and highly-seasoned foods, which are not conducive to aid digestion.

When the public learn the value of simple food and the value of balancing their rations, masticating their food thoroughly, breathing deeply, exercising every day, and sleeping seven or eight hours, they will have less cares and troubles and enjoy life as normal persons should.

All we have to build and sustain our body is what we eat, drink, and breathe. Consequently, it behooves each and every one of us to pay more attention to the quality of food, water, and air we consume. The better material we use to build up our bodies, the better, stronger, healthier bodies we will have.

New York, June 30, 1906. H. H. LANGDON.

Aeronautical Notes.

While the French have tired of balloons and are now experimenting with aeroplanes and dirigible airships, here in America one or two enthusiastic amateurs have just started in to try their hand at ballooning. Dr. Julian P. Thomas, of this city, has made several ascents of late, the longest of these being a night journey above Long Island Sound. The start was made from the gas works in 118th Street at 8:30 P. M. on Sunday, the 5th instant. A southwest wind carried the balloon, the "Nirvana" (of 50,000 cubic feet capacity) straight up the Sound. A landing was made in a farm yard at Noank, Conn., at 5 A. M. the next day, to procure food and water. A distance of 140 miles was covered to this point. Owing to the sun expanding the gas, the balloonists were enabled to rise to a greater altitude than before. As they soon approached the ocean, however, they were obliged to land, which they did in a marsh near Brant Rock, Mass., at noon on August 6. The total distance covered was 225 miles. Dr. Thomas was accompanied by Roy Knabenshue, of airship fame, and during the trip the aeronauts made a successful test of a new guide rope.

The French permanent aeronautic commission has clearly defined the different words used to designate apparatus employed in the new science of aerial navigation. In the first place "aéronef," or "appareil d'aviation" (aviation apparatus) means an apparatus heavier than air, of which there are several kinds, such as (1) L'Hélicoptere (helicopter), which is an aéronef which consists essentially of one or several propellers which assure sustentation and progression. (2) L'Aéroplane (aeroplane), an aéronef in which the sustentation is assured more especially by one or more flat or curved surfaces. (3) L'Orthoptère (orthopter) or mechanical bird, i.e., an aéronef sustained and propelled by beating wings. The word "aviateur," which is often improperly used, should be employed only to designate the person operating an aviation apparatus, as the word aeronaut designates a person who goes up in an "aérostat" (balloon or airship using a gas bag).

Automobile Notes.

The Automobile Club of America will this year hold its annual exhibition in the Grand Central Palace, New York city, the first week in December. The Licensed Association of Automobile Manufacturers will hold a show in Madison Square Garden in January, as heretofore.

A. Lee Guinness, a wealthy English amateur driver who purchased the 200-horse-power record-breaking Darracq racer that made a flying kilometer at Ormond last winter in 19 2-5 seconds, recently reduced this record 2-5 of a second with the same car on the beach at Ostend, Belgium. The new time is equivalent to a mile in 30.59 seconds, or a speed of 117.68 miles an hour.

The Automobile Club of France has lately published the regulations as regards the next annual Automobile Show, which is to be held at Paris. It will last from the 7th to the 23d of December. The Exposition of this year promises to be a greater success than ever, and one of the main reasons for this lies in the fact that the immense space of the Esplanade des Invalides, which lies across the Seine from the Grand Palace, is to be utilized this year to contain part of the exhibits. Last year's show, not finding enough space in the Grand Palace, made use of the adjacent Horticultural Buildings, which were quite filled with exhibits. This space is now too small to meet the demands, so that the use of the extensive grounds of the Esplanade, which give an unlimited space, was quite in order. No doubt several temporary structures will be erected here, with a large area for the stationary motors and heavy hauling cars. In connection with the show a touring event has been organized over a circuit which will run through the south of France to the coast. As regards the Show, the rules are about the same as for last year. One point to be noted is that owing to the great number of exhibits of automobile cars, it has been decided to exclude all bicycles or motor-cycles from the main exhibits of the Palace. The annex buildings outside of the Palace will contain heavy-weight cars, motors, combustibles and the aerostatic exhibits. Demands for space should be addressed before September 20 to the Commissariat General of the Exposition, at the Automobile Club's headquarters, 6 Place de la Concorde.

Cadmium gives protective coatings for iron much superior to zinc. The coat has the same aspect as zinc, but is much more adhesive, and harder.

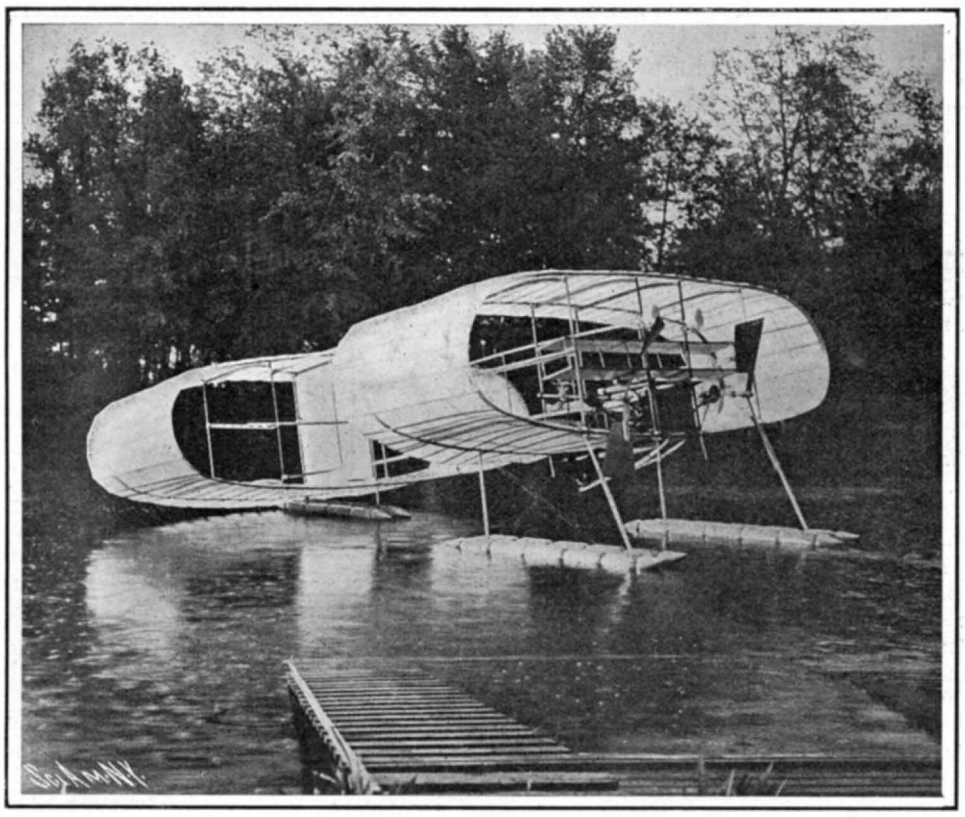
RECENT AERONAUTICS AND AIRSHIPS IN FRANCE.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

In France, and especially in the vicinity of Paris, there is great activity at present in the matter of airships and aeroplanes, and many are the new apparatus which are under construction at different places. It is mostly in the suburbs of the city that the new airships are being built and put through their experimental flights. Some of these have been only begun, or are at least in the first stages, while others are quite finished and have now made the first trials. The movement in favor of aeroplane apparatus is more strongly marked this year. Heretofore but few such flying machines have been produced, as most of the aeronauts directed their attention preferably to airships. It is no doubt due to the success which the Wright and other aeroplanes have had in America that the aeronauts in France are now taking up the subject, and some interesting developments are to be expected in this line.

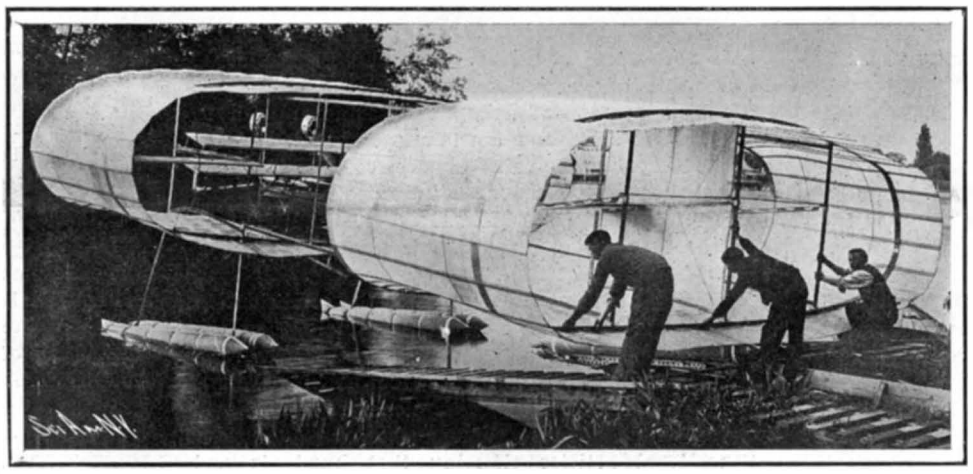
Perhaps this year we may see some successful flights with aeroplanes in France, seeing that aeronauts such as Tatin, Capt. Ferber, Archdeacon, and, more recently, Bleriot and Voisin, Florencie, and others at Paris, as well as Barlatier and Blanc at Marseilles, are now at work bringing out their machines, while the Prince of Monaco is furthering the enterprises of M. Léger. What has greatly stimulated the aeroplane work has been the founding of the Grand Prize of Aviation by the Aero Club of France. For this purpose the sum of $10,000 has been very generously subscribed by Senator Henri Deutsch and M. Ernest Archdeacon. M. Deutsch, it will be remembered, already founded the prize for airships which was won by Santos-Dumont in his memorable flight around the Eiffel Tower. Following the announcement of the prize we find a number of entries from the leading aeronauts, commencing with Santos Dumont, who enters his new helicopter, and followed by M. Florencié, with an *orthoptere* or flapping-wing apparatus resembling a bird in flight. Then we have M. Bellamy, with a new aeroplane, and Messrs. Bleriot and Voisin with the apparatus which we illustrate here. M. Léger's aeroplane, which is being built with great secrecy, will no doubt also be entered for the prize.

As regards the new aeroplane which Messrs. Bleriot and Voisin are constructing at their establishment in the suburbs of Paris, we present here a view of the aeroplane which was taken during the first experimental flight upon the Lake of Enghien. But a short flight was made, however, as it was found that some alterations were needed in the apparatus. The Bleriot aeroplane is formed of two elliptical parts which are built of canvas stretched upon a frame of light wood. A supporting surface of 60 or 70 square yards is given by the two frames. The surfaces are formed of varnished French silk. In front of the foremost elliptical frame are placed two 6-foot propellers, which are driven at a speed of 600 revolutions per minute when in flight by means of an exceptionally light gasoline motor known as the "Antoinette." This motor, which, as used in a high-speed motor boat, was illustrated in our last Motor Boat and Sportsman's number, has 8 cylinders fitted in V-shape upon a long aluminium crank case. It will give 24 horse-power, and, as it is one of the lightest gasoline motors which has thus far been constructed, it marks in itself a great advance in the question of aviation. The propellers produce a tractive effort of 170 pounds. Each has a separate flexible shaft running from the motor and driven through gearing, while clutches allow of disconnecting either propeller at will.



The Bleriot Aeroplane Ready for a Flight Over Water.

The operator is seated back of the forward ellipse with his feet upon bars that control the double horizontal rudder in front. The two propellers are driven by an 8-cylinder gasoline motor of 24 horse-power through bevel gears and flexible shafting. The apparatus resembles somewhat Ludlow's aeroplane.

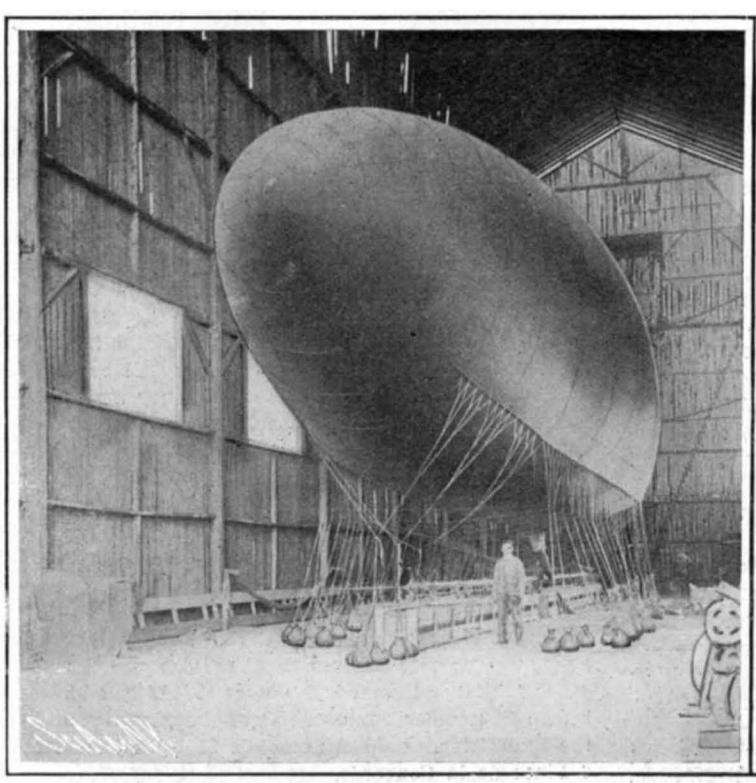


Launching the Bleriot Aeroplane.

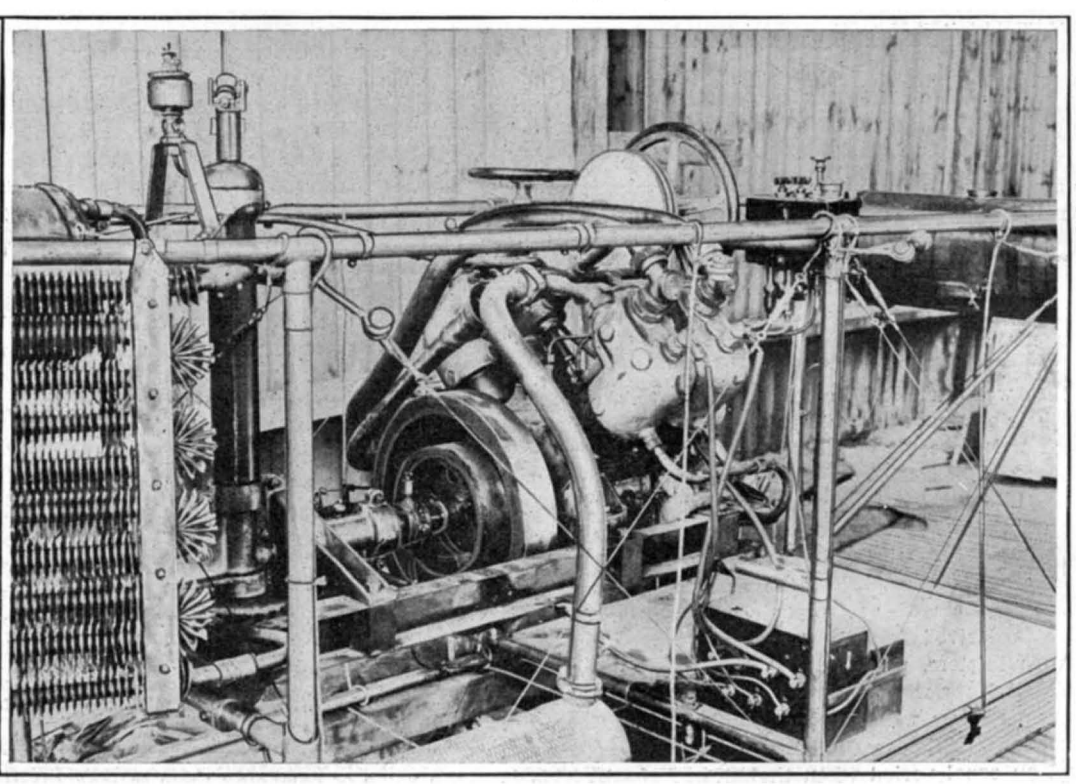
The aeroplane is supported upon floats consisting of cylinders of rubber-covered canvas inflated with air.

The aeroplane is mounted upon detachable floats of rubber-covered canvas filled with air. The Bleriot apparatus has been built with the idea in mind of competing for the Grand Prix, and it is proposed to put it through a series of successive experiments. It has seats for one or two persons. Horizontal and vertical rudders make it quite steady in either direction. One of our illustrations shows the operator with his feet upon the curved bars that control the setting of the double horizontal rudder in front. In a series of trials conducted not long ago in the grounds of the Aeronautic Club near Paris, the aeroplane made a number of flights and seemed to perform very well.

We may mention briefly some of the other aeroplanes which are now in construction, reserving for a future article a more complete and illustrated description. M. Florencie, a member of the Aero Club, is bringing out an aeroplane which is quite different from the above, and consists of two canvas-covered frames resembling wings, attached to either side of a central frame. The wings are made to flap up and down to imitate a bird's flight. One part of the wing is entirely covered with canvas so as to beat the air, while another part is made so as to imitate the action of a bird's feathers, and is formed of a series of longitudinal flaps, fixed at the edges to a wire gauze network, so that the flap is made to close when the wing is brought down, but keeps open when the wing is raised. The middle part of the aeroplane is adapted to be fitted upon the aeronaut's body, and he works the wings by means of stirrups attached to his feet and connected to the wings by cords. Stretching out the legs causes



Count de la Vaulx's Airship is 114.8 Feet Long and 26 Feet in Diameter. It Contains a Compensating Ballonette of 140 Cubic Yards Capacity.



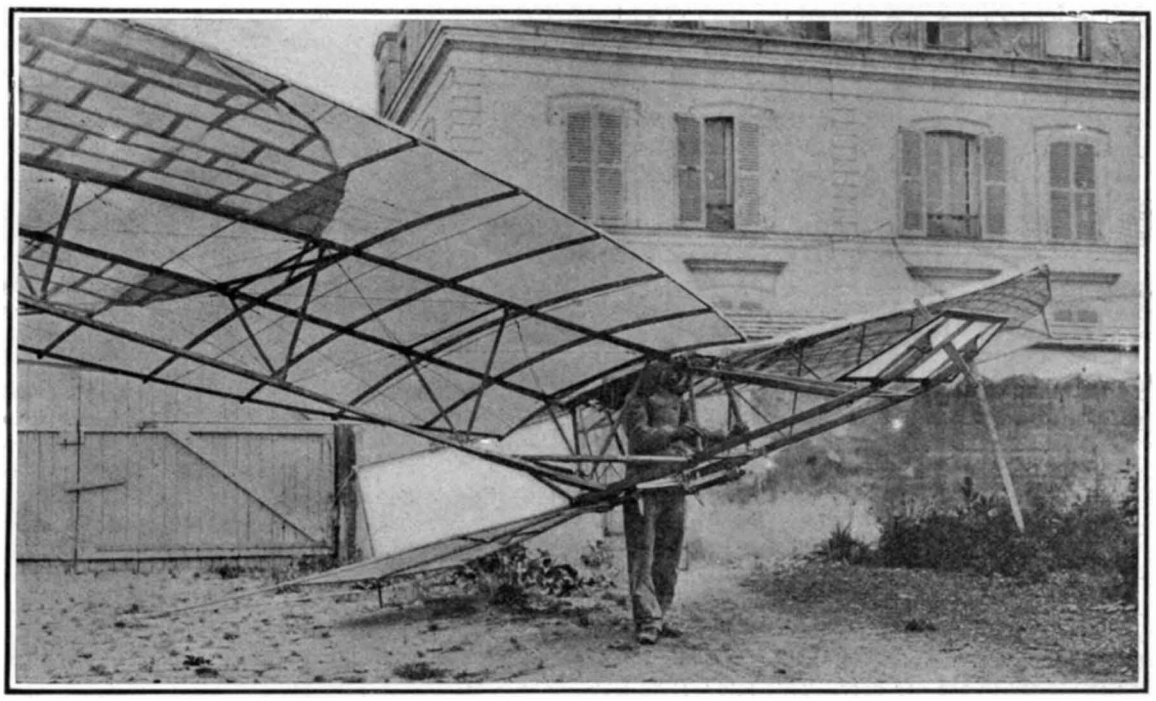
The Airship is Driven by a 4-Cylinder Gasoline Motor of 16 Horse-Power Having Its Cylinders Arranged in Pairs at an Angle of 90 Degrees.

RECENT AERONAUTICS AND AIRSHIPS IN FRANCE.

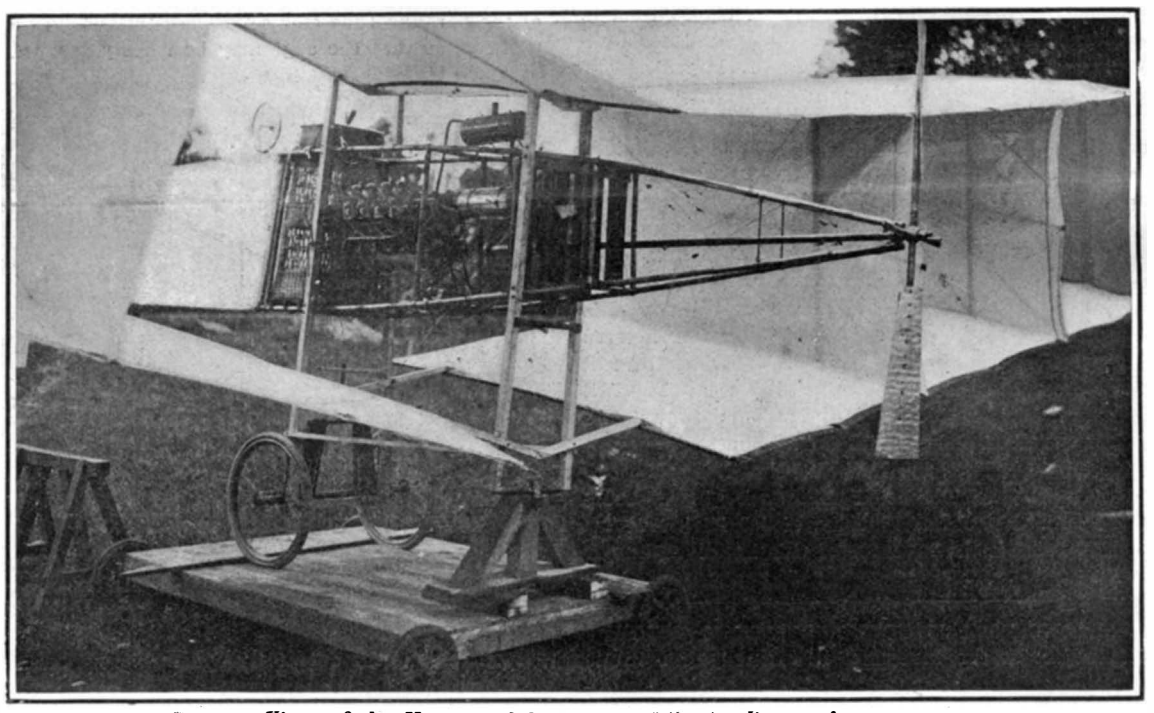
a lowering of the wings, and they are raised by a spring which is fixed to the frame. In front is placed a balancing weight, while in the rear is a rudder forming the tail. The apparatus is 45 feet wide over the wings and the surface is 30 square yards, with a weight of 30 pounds.

Work upon the new aeroplane which M. Léger is constructing for the Prince of Monaco has been carried on for some time past. M. Léger brought out a machine last year which had some success, and this year he is following up his results and making some changes. The first machine was a helicopter, and consisted of two horizontal propellers (one above the other) revolved in opposite directions by a 12-horse-power gasoline motor. On one trial it lifted over 200 pounds net weight. The new machine will no doubt be considerably modified. It is to be tried in France at the Chateau of Marchais, belonging to the Prince of Monaco, and the results of the trials are to be kept secret for the present. At Marseilles, the new Barlatier and Blanc aeroplane is making its trials. An inclined plane which can be turned at an angle is mounted in front, and in the rear are two smaller planes, one on each side, forming the tail. The central framework contains two propellers driven on horizontal shafts by a Buchet gasoline motor. It is expected to carry one person, and at present the machine is being enlarged.

Perhaps the most important of all recent French aeronautic craft is Santos-Dumont's aeroplane. The machine has been christened "14bis," and has been constructed primarily with a view to competing for the $10,000 Deutsch-Archdeacon aeroplane prize, as well as for the Archdeacon cup of $600 which goes to the first man who sails through the air a distance of 25 meters (82 feet) with a maximum angle of drop of 25 per cent, and the prize of $300 for the first aeroplane to go 100 meters (328 feet) with a maximum variation in level of 10 per cent. The "14bis" is built on the lines of a giant bird of prey with the exception that in this case the tail or rudder end constitutes the front of the machine, which consists of a long central body carrying the box rudder and two lateral planes forming a dihedral angle. The aeroplane measures 12 meters (39.37 feet) in width and 10 meters (32.8 feet) in length. It has 861 square feet of sustaining surface. Its weight is 352¾ pounds. This, with Santos-Dumont's weight (110¼) makes a total of 463 pounds. The frame, although smaller than the frames of the Santos-Dumont dirigible airships, is nevertheless designed on substantially the same lines. It supports a two-bladed propeller of aluminium directly driven by the motor at an average speed of 1,100 revolutions per minute. Behind the motor is a radiator of Santos-Dumont's own design. The motor, built by Lavavasseur, is of 24 horse-power, and weighs only 2.64 pounds per horse-power. It is an 8-cylinder V motor of 80 millimeters (3.149 inches) bore and stroke, and 79.36 pounds total weight. Its length over all is 24½ inches, and its width and height 19½. It has automatic inlet valves, jump spark ignition, and develops its rated horse-power at 1,800 revolutions per minute.



The Florencie Orthopter, or Flapping-Wing Machine.

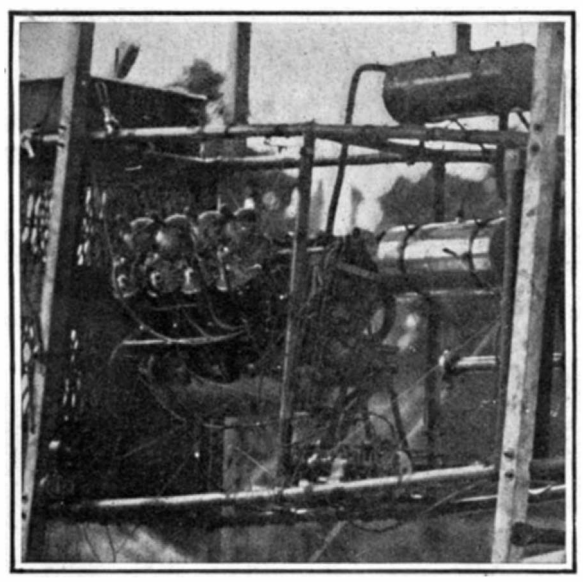


General View of the Motor and Propeller of Santos-Dumont's Aeroplane.

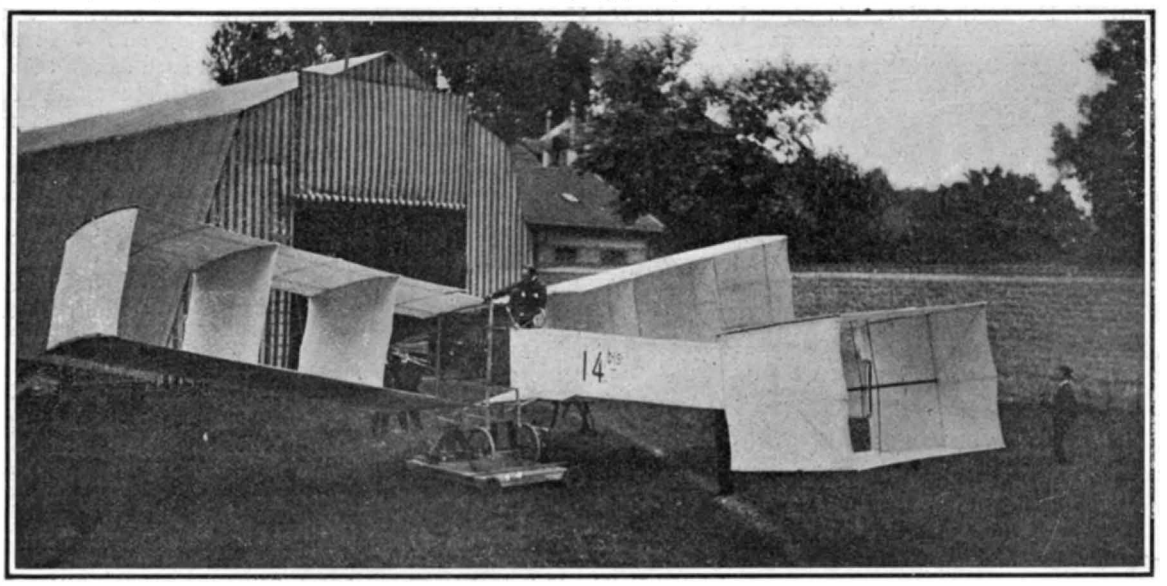
The basket is of the form which Santos-Dumont has always employed in his dirigible airships. This basket is 3 feet high and not much more than 1 foot square. Only a man of Santos-Dumont's slight figure could find it roomy enough. Within easy reach of the aeronaut are the various levers which control the engine, the fuel supply, and the rudder. The latter, which is about 25 feet forward of the motor on the end of a long horizontally-projecting vertical plane, is similar to a huge box kite cell and can be moved in any direction. A small wheel at the aeronaut's right controls the vertical movement, while a lever at his left controls the horizontal. The rudder, as well as the machine itself, is built up of a stiff framework of bamboo and rattan covered with canvas.

The frame of the aeroplane is suitably braced, and is carried on pneumatic-tired bicycle wheels, upon which the entire flying machine is driven at a constantly accelerating speed until it rises spontaneously from the ground. In a recent test, Santos-Dumont used a small dirigible, the aeroplane supplanting the usual car or nacelle. This was fairly successful; but no free flight has as yet been attempted.

The question of airships proper has by no means been dropped. Among others we may mention the new military airship which is to be used by the French government, and which has been ordered by the Minister of War from Messrs. Lebaudy. It will be a modification of the well-known Lebaudy airship, which is one of the most successful so far. The mechanical part is under construction at Paris, while the balloon and the rigging are set up at the Lebaudy balloon shed at Moissan. It will no doubt be used by the War Department at the town of Toul, while the first Lebaudy airship has been allotted to Verdun, both places lying near the German frontier. In the neighborhood of Paris, the new airship built by Count De la Vaulx has received its preliminary trials, during the second of which the Count maneuvered the airship for eight consecutive hours, putting it through all kinds of evolutions with complete success. On the first flight the airship started out well, but it was obliged to alight owing to an accident to the friction clutch of the motor. The photo we reproduce shows a view of it taken at the Aero Club. The cigar-shaped balloon measures 114.8 feet long and 23 feet in diameter. Inside is an air bag, or ballonette, of 140 cubic yards capacity. Below it is suspended a short body the framework of which is constructed of steel tubing. Each end of the body tapers to a point, and in front is mounted the radiator. In the middle is the 16-horse-power, 4-cylinder, water-cooled gasoline motor, which will work the propeller at the end of a long shaft. Back of the motor is a cylindrical gasoline tank.



The Motor of Santos-Dumont's Aeroplane.



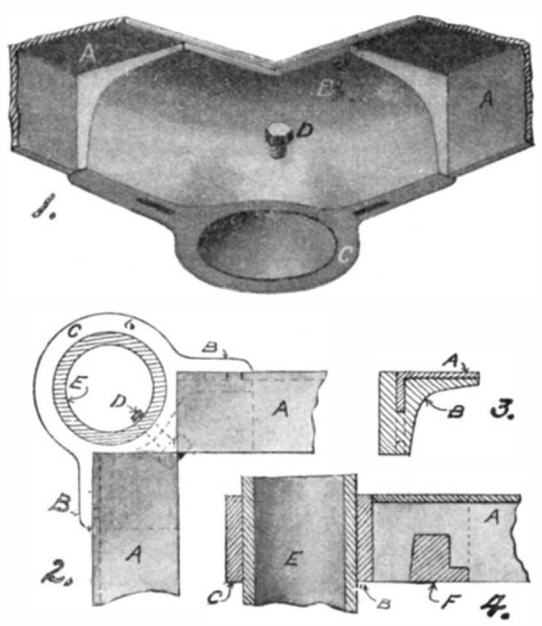
Santos-Dumont's Aeroplane. The Inventor is Seated on Top of the Basket, Just Ahead of the Motor.

RECENT AEROPLANES AND AIRSHIPS IN FRANCE.

Patent Department

AN IMPROVED BED-RAIL JOINT.

A recent invention which is illustrated herewith provides improvements in corner joints or fastenings for the rails of metal beds. The joint is very simple in construction, and can be made cheaply because it does

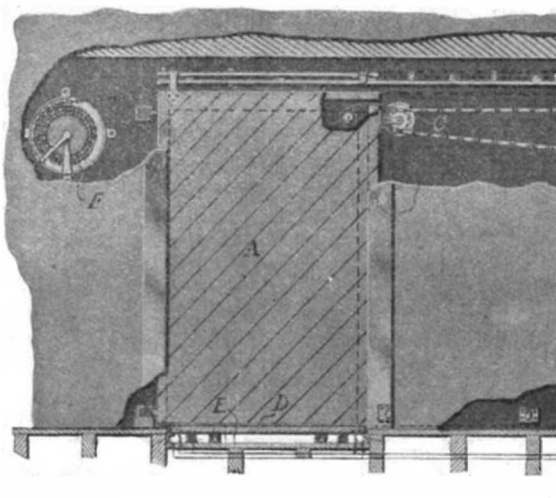


AN IMPROVED BED-RAIL JOINT.

away with the casting on the side rail, and it also reduces the amount of iron in the bracket to one-half or less. Fig. 1 shows the joint double, as used for brass beds. The joint is illustrated as tipped back to reveal the under side. The rails of the bed are indicated at *A*, and the bracket at *B*. It is understood that the bracket can be fastened by bolt *D*, or by pouring the iron around the pillar so as to shrink it on. Fig. 2 is a top view of the double joint. Fig. 4 is a view of the single joint, such as is used for iron beds, showing the slot cut in the rail, also the slightly tapered bridge piece near the bracket. This is shown by the cutting away of the outside face *B* of Fig. 2. Fig. 3 is a cross section of the rail-bearing part of the bracket. The rail is cut off square, and the slot is punched out slightly tapered, to match the tapered bridge piece, which serves to crowd or wedge the rail toward the corner post as it is forced home. The rail is thus readily secured without bolts or screws, and will keep the bed ends vertical at all times, regardless of the weight carried by the bed. It will also be evident that the joint is effected without forging or bending the rail. Mr. James Murphy, of 700 Park Avenue, Kenosha, Wis., is the inventor of this improved corner joint.

AUTOMATIC DOOR OPENING AND CLOSING DEVICE.

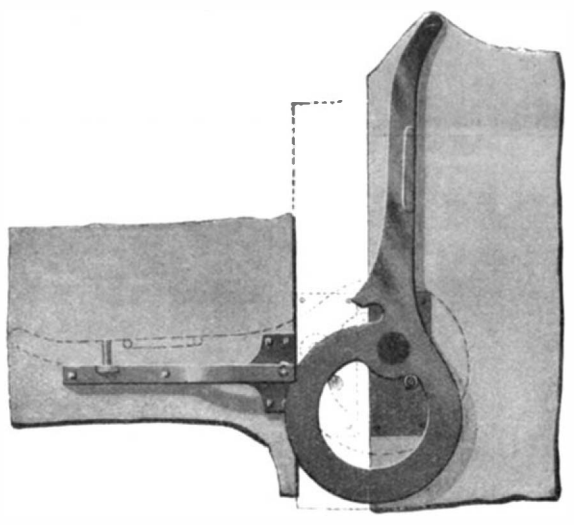
The object of the invention illustrated herewith is to provide an automatic door opening and closing device, controlled by a person walking on a movable platform arranged adjacent to the door. The invention is more particularly applicable to a sliding door, such as a barn door, and the like. In the engraving a door of this type is indicated at *A*. The door is mounted to slide on an overhead track into a pocket in the side of the wall. In this pocket a motor is mounted. The armature shaft is fitted with a sprocket wheel, *B*. A chain on this wheel passes to a second sprocket wheel, *C*, mounted on the door *A*. A wheel, secured to the sprocket wheel *C*, is engaged by a spring-pressed brake shoe, which normally prevents the sprocket *C* from turning. The movable platform, as indicated at *D*, is supported on springs in a recess, *E*, of the floor. The platform is provided with contact plates at opposite ends, adapted to engage similar plates in the recess when the platform is depressed. In this manner the circuit of the motor is closed whenever anyone steps on the platform. The motor then draws up the chain on the sprocket *B*, opening the door. When the door reaches the position indicated by dotted lines, it is stopped by a pair of spring buffers. But as long as the platform is depressed, the motor will keep drawing in the chain; and for this reason a brake is provided, for it permits the sprocket *C* to turn after the door *A* has reached the limit of its motion. As soon as the platform *D* is released the motor stops running, and the door is then drawn back by a spring-operated reel, *F*, acting on a chain connected to the forward edge of the door. The inventor of this novel door opening and closing mechanism is Mr. Cleophas Gamache, of Barre, Vt.



AUTOMATIC DOOR OPENING AND CLOSING DEVICE.

CAR DOOR FASTENER.

The car door fastener which is herewith illustrated is of very simple construction, having no parts liable to get out of order, and being so designed that it cannot be released without breaking the car seal. The invention is particularly applicable to freight cars, and it is so designed that when the fastener is moved in the releasing direction, it will start the door toward its opening position. In our illustration we show the fastener in its open position, while the closed position is indicated by dotted lines. A portion of the car wall is shown at the left, and this carries a bar provided with a slot adapted to receive a lug formed on the latch which is hinged to the car door. This latch, it will be observed, comprises a handle portion on which the lug is formed, and a cam ring eccentrically disposed with respect to the pivot pin of the latch. When the fastener is closed, the handle lies flush with the bar on the car wall. A wire is then passed through an opening in the handle and a lug on the bar, and to this wire the usual seal is attached. Not until this seal is broken will it be possible to open the door. In opening the door the eccentric ring engages an anti-friction roller at the end of the bar, and thus starts the door toward its opening position, so that the edge may be readily grasped by a

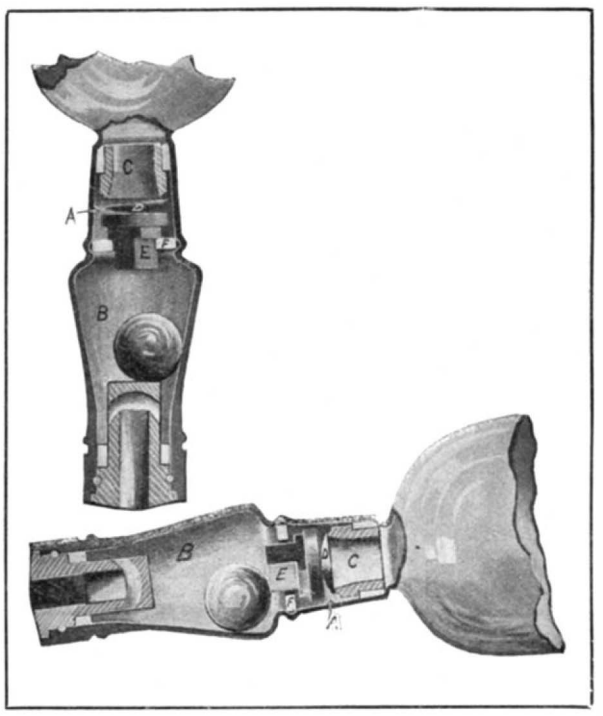


CAR DOOR FASTENER.

person to slide the door fully open. The eccentric ring is formed with an inner projection adapted to engage a stop pin, to stop the member when in the vertical position illustrated. By this arrangement, when the eccentric comes in contact with the anti-friction roller upon closing the door, the fastener will be automatically moved down to locking position. The inventor of this car door fastener is Mr. F. L. Estes, of 27 Bridge Avenue, Nashville, Tenn.

NON-REFILLABLE BOTTLE.

In the accompanying engraving we illustrate a non-refillable bottle, which not only appears to be absolutely non-refillable, but also is of such design that the cost of manufacture is but a fraction above that of the ordinary bottle. In addition to a ball weight, the improved bottle makes use of a float for operating the valve, so that in any attempt to fill the bottle the valve will be closed by the float when the bottle is inverted and by the weight when the bottle is in upright position. This principle is not entirely new, but heretofore bottles of such design could be readily filled if held in a horizontal position. In the new bottle this objection is overcome by a novel construction of that portion of the neck in which the ball weight operates. The neck is formed with a float chamber *A* and a ball chamber *B*. Fitted into the bottom of the float chamber is a glass valve seat, *C*. The valve, also of glass, is shown at *D*. Both the valve and valve seat are ground to provide a perfect closure. The float, which is indicated at *E*, is confined with a small amount of play in its chamber by the collar *F*. The shank of this float projects through the collar, and against this shank the ball is adapted to roll when the bottle is tilted upward. The object of confining the float is to give perfect freedom of movement to the ball, a feature which is a great improvement over previous constructions.

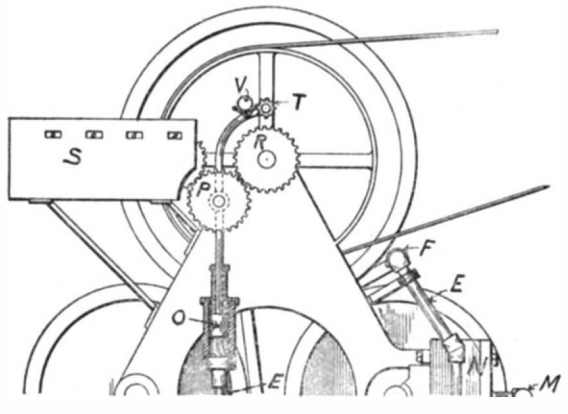


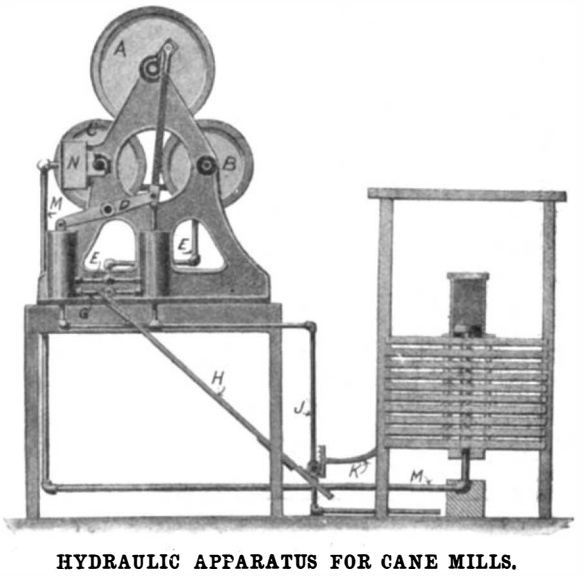
NON-REFILLABLE BOTTLE.

It will be observed that the chamber *B* flares at the bottom, providing an inclined surface for the ball to roll upon. This surface is not a plane surface, but is slightly convex, so that it is next to impossible to balance the ball midway of the chamber. Owing also to the inclination of the wall, the bottle cannot be held in a horizontal, or even approximately horizontal, position without the ball rolling against the float and thereby closing the valve. The top of the ball chamber is closed by a glass plug of such design that it would be impossible to insert a wire into the bottle neck to hold the ball clear of the float. This plug is cemented in place, so that it is impossible to remove it without breaking the bottle. An ordinary cork is used to close the opening through the plug. The inventor of this improved non-refillable bottle is Mr. P. Anthony Brock, 74 Lembeck Avenue, Jersey City, N. J.

HYDRAULIC APPARATUS FOR CANE MILLS.

In sugar-cane mills it is customary to pass the cane through two or more sets of rolls. The first set squeezes out most of the juice, reducing the cane to a sort of trash known as bagasse. The latter is then sprinkled with water and passed through the next set





HYDRAULIC APPARATUS FOR CANE MILLS.

of rolls, which squeeze out this water with the sugar it has dissolved. A recent invention, which we illustrate herewith, provides means for regulating the flow of water through the bagasse, for registering the amount of bagasse passing between the rollers, and for sounding an alarm when the passage of the bagasse ceases. A general side elevation of a mill provided with these improvements is shown in Fig. 1. Three rolls, *A*, *B*, and *C*, are indicated, the roll *A* being driven by a pulley and belt, as shown in Fig. 2, which is a view of a portion of the opposite side of the machine. The shaft which carries roll *A* is provided at one end with a crank connected by a rod with the walking beam *D* of a double-cylinder pump, so that while the roll is turning, this pump will be in operation. Normally the pump serves to force water through the pipes *E* to the sprinkling head *F*. The latter is provided with a spring valve, which may be adjusted to limit the amount of water sprinkled on the bagasse. A pipe *G* connects the two cylinders of the pump, providing a by-pass. The latter is normally closed by a valve operated by the inclined rack-bar *H*. This bar also engages a pinion connected with a valve in the supply pipe *J* of the pump. The pinion also meshes with a rack *K*, connected to a vertically-movable cylinder *L*. The cylinder is slidable on a fixed piston, and is weighted down by a series of detachable weights. A pipe *M* communicating with the interior of this cylinder runs to a pair of smaller cylinders *N*, placed one at each end of the roll, *C*. The shaft which carries this roll is movable horizontally in its bearing, and is connected with pistons adapted to operate in the cylinders *N*. While the bagasse is passing between the rolls, it will keep the roll *C* in its outer position, thus lifting the cylinder *L* by hydraulic pressure, opening the valve of the supply pipe, *J*, and closing the valve of the pipe, *G*. The pump will, therefore, continue to supply the sprinkling head *F*. But as soon as the passage of bagasse ceases, the weighted cylinder will move back the roll *C*, cut off the supply of water, and by opening the by-pass *G* prevent the pump from forcing water into the sprinkling head. On the opposite side of the machine is the recording mechanism. When water is pumped into the sprinkling head it operates to lift a piston, *O*, raising an idle pinion, *P*, into mesh with the gear wheel *R* on the shaft of the roll *A*, and the gear of the recording mechanism *S*. The latter records the number of revolutions of the roll *A* while the sprinkling head is in operation, or in other words, while the bagasse is passing; but when this ceases the pinion drops, disconnecting the gear, while a small pinion *T* is thrown into mesh with the wheel *R*, and rings an alarm *V* to notify the engineer so that he may stop the machine. A patent on this improved cane mill has recently been granted to Mr. J. C. Searle, Lalamilo Post Office, Puako Pthi, Hawaii.

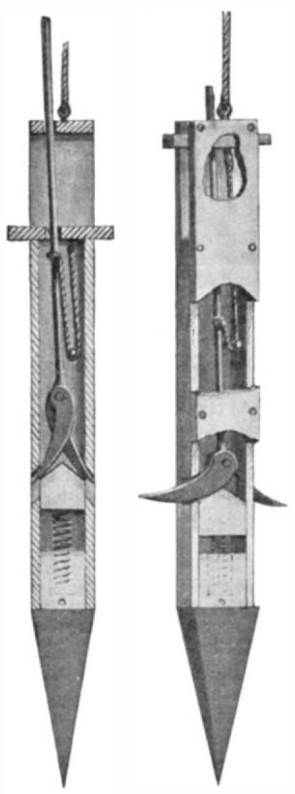
A NOVEL TOBACCO PIPE.

Many inventions have been made from time to time, with a view to preventing nicotine from being drawn up through the stem of the tobacco pipe and into the smoker's mouth. The latest invention along this line, which we show in the accompanying engraving, is a radical departure from all previous designs. The pipe has the appearance of a pear, the bowl being entirely inclosed with the exception of a ventilation opening in the bottom. The body of the pipe is made up of three members, which are threaded together, as indicated in the drawing. The central member contains the bowl proper, or holder. This consists of a sleeve with wire netting over each end. The netting at the lower end is carried in a cap hinged to the tobacco holder. A suitable lining is interposed between the holder and the body of the pipe. In use the bottom section of the pipe body is removed, and the holder is filled with tobacco. The latter is now lighted in the usual manner, and the section screwed on again. The top section of the pipe body is provided with a lining, which will absorb any tainted saliva or nicotine that passes up into the upper section. This lining can be removed at any time and replaced by a new one. As the tobacco is almost completely inclosed, no sparks can pass out, and the pipe is thus rendered perfectly safe in almost any place. A patent on this improved tobacco pipe has been secured by Mr. Neal P. Shulin, of Butte, Mont., Box 1265.

A NOVEL TOBACCO PIPE.

ANCHOR FOR AIRSHIPS.

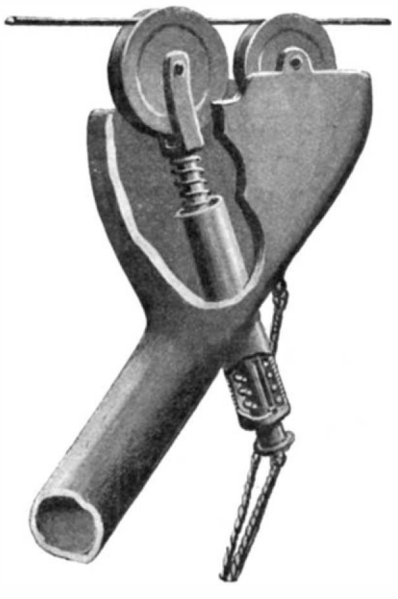
Pictured in the accompanying engraving is an improved anchor for airships invented by Mr. David Thomas, of 2526 Ocean Boulevard, San Francisco, Cal. The anchor is of the harpoon type, being adapted to penetrate into the ground when thrown from an airship, and having prongs or claws which will move out laterally and prevent the anchor from being dislodged. The design is such that the claws will not move out until the anchor has penetrated the ground to a predetermined depth. After the anchor is firmly fixed, the airship may be drawn down by winding up the anchor rope on a windlass. The body of the anchor consists of a hollow boxlike structure shod with a sharp metal point. The point is provided with a shank, which extends upward into the body of the anchor. Fitted in a socket in the shank is a compression spring, which at its upper end supports a slidable guide block. The claws or prongs rest on the guide block, and are hinged to a rod which has bearing in a cap at the top of the anchor. The rope attached to this rod passes under a peg, and is secured to a slidable crossbar near the top of the anchor, as shown in the engraving. The ends of the crossbar project through slots in the anchor body. When the anchor is driven into the ground, these projecting ends engage the surface of the ground, causing the crossbar to rise relatively to the anchor, and thus pulling down the rod and forcing the prongs out through slots in the side walls of the anchor. When it is desired to raise the anchor, enough earth is removed to allow the crossbar to slide to normal position, after which the anchor may be drawn up by pulling on the projecting end of the rod.



ANCHOR FOR AIRSHIPS.

AN IMPROVED TROLLEY.

With the purpose of overcoming the common liability of a trolley to run off a trolley wire, an inventor in Texas has devised the double wheel trolley illustrated herewith. One of the wheels is secured to the trolley harp in the usual manner, while the other is mounted yieldingly therein. The latter, or auxiliary trolley wheel, is journaled in the forked end of a rod which fits in a tube secured to the harp. A spiral spring in the tube and coiled about the rod serves to press the auxiliary wheel outward. Both of the wheels serve as conductors for electric fluid, and owing to the peculiar manner in which the auxiliary wheel is mounted, it retains its true engagement with the trolley wire, irrespective of jumping or swinging of the pole. A cord is attached to the rod which carries the auxiliary wheel, and when it is desired to draw down the pole for the purpose of clearing crossings and overhead structures, this cord should be pulled, so that when the pole is moved down, the auxiliary wheel also moves down in the harp. This avoids entangling the auxiliary wheel with overhead structures when the pole is drawn down. The spring-sustained wheel will bear yieldingly against the wire at all times during the operation of the trolley, and will take from the same the shock incident to vertical movement of the trolley against the wire. Owing to the inertia of the trolley pole, the trolley in ordinary constructions often fails to follow the trolley wire when the latter is set swinging. In the present case the inertia of the auxiliary wheel is inconsiderable, and it will not fail to keep in touch with the trolley wire. It will be noticed that the auxiliary wheel-supporting rod is so mounted on the harp that it moves approximately tangent to the arc of the circle described by the end of the pole, and as a consequence will respond more quickly to the impulse of the spring, and will require less time to pass through the entire extent of movement with respect to the harp necessary to maintain the wheel in contact with the trolley wire than were it mounted to move perpendicularly thereto. The inventor of this improved trolley is Mr. G. E. Ward, Abilene, Texas (Box 28).



AN IMPROVED TROLLEY.

Brief Notes Concerning Inventions.

With a new model of the Colt automatic pistol just placed on the market, a novelty is being introduced in the shape of a holster and stock combined, which greatly enlarges the weapon's sphere of usefulness. Being taken from its case, the weapon may be attached to it and the combination made use of as a shoulder piece, and utilized in bringing down larger game than possible with the use of the pistol alone.

The matter of who is "next" in the barber shop often occasions unpleasant incidents, and the offended person may leave the place, never to return. To obviate these incidents, a mechanical device has recently been invented by which the patrons are summoned in proper order. It consists of a dial secured in a prominent part of the place. The patron has merely to glance at this at such times as his attention is attracted by the ringing of a bell, and when he sees the number which corresponds to that on a check which was handed to him as he entered, he knows it is his turn. This signal is given by the barber whose chair has just been vacated, by touching an electric button placed at a convenient point on the chair or fixtures.

Stone and mosaic floorings have been rendered expensive by the large amount of hand work required in the laying and finishing. After laying as carefully as possible, the method of giving the finish consisted of rubbing it down with a heavy stone and a suitable abrasive, such as sand. This stone was pulled back and forth by two men, and the operation was therefore a tedious and expensive one. A machine has been recently invented and used with great success in this work. It consists of a motor mounted on a four-wheeled truck, with several horizontally-mounted grinding wheels which are driven by the motor. The machine is guided by an operator, who rides upon it. The grinding wheels are thirteen inches in diameter, and are arranged to entirely cover a path thirty-three inches in width. These grinders make two hundred revolutions per minute, leave the floor in a perfectly finished condition, and when at work travel fifteen feet per minute.

William S. Meade, who is said to have made a fortune of $250,000 in a process discovered by him for the preservation of meat, recently died in a New York lodging house, penniless. He originally came from Buffalo, N. Y., and drifted to the West, where he made his meat-preserving discovery. Afterward, while on the Pacific coast, he befriended an old sea captain, who claimed to know the resting place of a sunken treasure boat, and upon the captain's death Meade was bequeathed a number of charts and directions in cipher for locating the craft. Meade's whole fortune was wasted in an effort to find this boat. At his own expense he sent out three expeditions. Two of them came to grief on the coast of South America, and the third was abandoned after cruising along the coast of Chile and Peru for several years in search of the treasure. During the latter part of his life Meade made a living by peddling various articles in New York offices.

It is the common practice of nearly all trolley companies to keep the curves in the track lubricated by an application of grease. This is essential in order that the cars shall not jump the tracks when rounding the corners. The material made use of is a composition of tar, and it is frequently the cause of complaints from passengers and others who get it on their clothing. A suggestion to make use of water in this connection has been under trial at Sacramento, Cal., and it is said to have been successful in every respect. It is proposed to fit out each car with a small water tank, and with an outlet just over the track and in front of the wheels. Upon encountering any deviation in the tracks, this device is automatically put into operation, and a tiny stream of water is directed on the inner surfaces of the track, which is the part that comes in contact with the wheel in making the turn. This is said to answer all purposes. In view of the success of the experiment, a company has been formed to exploit the invention and to introduce it generally through the country.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

MARKING DEVICE FOR SKIRTS.—MARGARET HALL, Vancouver, Wash. The invention has reference more especially to devices or structures for marking ladies' garments—such as skirts, coats, cloaks, dresses, and the like—on a line at which to cut or hem the garment to derive a hang thereof at the bottom a uniform distance all around from the ground or floor. The device is collapsible and occupies but small space in shipment or transportation or when not in use.

SHOE-HEEL.—R. I. HERRMANN, Roulette, Pa. The invention relates to improvements in heels for shoes, the object being to provide a heel which may be firmly yet detachably connected to shoes, so that the heels may be transferred or substituted one for the other when worn down at one side, thus not only equalizing the shape of the heels, but keeping the footwear in proper form.

Electrical Devices.

TROLLEY.—J. H. WALKER, Lexington, Ky. Various improvements are included in this patent relating to the trolley harp, its connection with the conductor wire of the pole, and the manner of mounting the trolley wheel. It is figured by this inventor that the improvements will prolong the life of the trolley harp and its attachments and result in greater convenience in effecting the necessary adjustments due to wear and usage.

TROLLEY-POLE.—P. DUDLEY, Asbury Park, N. J. The purpose of the invention is to provide a ball-and-socket connection between the fork for the trolley wheel and the pole and a laterally-curved guide and support for the fork, which construction allows the wheeel to accurately follow the wire when the latter is not exactly overhead and also to follow the wire upon all manner of curves, said construction also insuring the wheel being straight upon the wire regardless of the angle of the pole.

TELEPHONE ATTACHMENT.—F. F. HOWE, Cleveland, Ohio. The inventor provides means whereby the swinging spring-pressed carrier may be moved in either direction from its normal position and will when so moved release the rocker connected with the telephone-switch, so that if the carrier be moved laterally in one direction to permit application of the receiver to the left ear or laterally in the opposite direction to permit the application of the receiver to the right ear the rocker will be released in both instances to open the telephone-switch. It is an improvement particularly in that class illustrated in a former patent issued to Mr. Howe.

CORD-SUSPENSION ELECTRIC DENTAL ENGINE.—J. V. TRENAMAN, New York, N. Y. In this case the improvement pertains to means for mounting and manipulating dental engines, and more particularly to the means for suspending the electric motor and its accompanying parts. The device is neat in appearance and materially increases the quality of the insulation as between the wires and other metallic parts.

Of Interest to Farmers.

SHIPPING-COOP.—H. B. FRY and T. B. FRY, Memphis, Tenn. This improvement has reference to shipping coops or crates such as are used for transporting live fowls. The object of the invention is the production of a coop of this kind which is simple in construction and which is sanitary and which is capable of being folded up compactly for return shipment.

CORN-TOPPING TOOL.—F. W. GORDON, Miami, Tex. The object of the inventor is to provide a cutting-tool that may be placed on either or on both hands of the operator and cut corn-heads from the stalks when the heads have been grasped and the tool or tools subsequently manipulated so as to forcibly impinge the sharp edge of a knife that is a part of each tool against the stalk near the head while the latter is grasped, the cut heads being thrown into a receptacle, thus expediting the operation of removing heads of cereals from the standing stalks.

MOWING-MACHINE.—S. D. GRIMM, Concordia, Kan. In this machine the sickle bar is operated by a lever as its fulcrum intermediate its ends, the outer end being connected by a ball and socket joint and pitman rod with the sickle bar and the inner end arranged to engage two rollers each provided with cam grooves so that the rotation of the rollers with suitable gearing giving the desired speed, will effect horizontal rocking of the lever to actuate the cutting devices.

STRIPPING AND CLEANING MACHINE.—E. BEHRENDT, Batangas, Philippine Islands. The object in this case is to provide a machine especially adapted for treating the leaf-sheaths or band-like material stripped off the abaca and like plants and arranged to permit a quick and thorough separation of the pulp and freeing the fibers without injury to the latter, the fibers being completely freed or cleaned of the pulp.

LAND-ROLLER.—S. WARNER, West Union, Ind. This roller is especially adapted for rolling listed corn, being capable of operating upon two or more listed ridges. A purpose of the invention is to provide rollers especially adapted to the shape of the ridges and which will not only roll the top or crown of a ridge, but will also crush the earth at the side edges where it is most needed. Means are provided for adjusting the rollers bodily upon their supports to accommodate them to different-sized furrows made by different-sized listers.

WATER-REGULATOR.—R. J. POWERS, Chicago, Ill. The invention relates to novel means for regulating the water admitted to troughs, tanks, and other receivers by which means to automatically cut off the water-supply when the trough is full. It is particularly adapted for use in connection with stock-waterers; but it is useful in other ways.

Of General Interest.

SLIDING DOOR.—J. S. SCHLOSSER, Chicago, Ill. This invention relates to sliding doors such as used on stables and cars. The object of the invention is to produce a sliding door which is hung in a simple manner, and which may be readily opened and closed, and which will operate to close the doorway tightly when the door occupies its closed position.

BUFFER.—S. M. GOLDBERG, New York, N. Y. The invention refers to a toilet article employed for polishing nails. The principal objects thereof are to provide a device with a buffing-surface which can be readily removed and replaced, so that when worn the entire article does not have to be discarded, also to provide means for securely holding the buffing material upon a base, and to provide a removable handle.

VAGINAL IRRIGATING DEVICE.—V. SALCEDO, Apaseo, Guanajuato, Mexico. One purpose of the invention is to provide a hygienic device for the organs and protecting them during such operation, which device is externally applied and is provided with means for ventilation and introduction of the cannula of a syringe without bringing same in contact with the person and also means for conducting refuse to a distant receptacle, thus protecting clothing and bedding.

LIQUID-COOLER.—F. D. H. KLUHSMEIER, New York, N. Y. In this case the invention pertains particularly to improvements in devices for cooling beer drawn from a faucet having direct connection with a keg, the object being to provide a device of this character that will keep the beer at a proper temperature, and, further, to so arrange the device as to supply ice water.

TAILOR'S MEASURE.—HESTER A. WOOLMAN and E. Z. LESH, Guadalajara, Jalisco, Mexico. In this patent the invention relates to tailors' measures such as used in marking garments before cutting. The object is the production of a measure having scales and marking-curves conveniently placed for the purpose of facilitating the measuring and marking operations. The device is preferably in the form of a plate the edges of which are formed with scales and curved in certain parts.

SEWER-PIPE.—G. FELTZ and W. S. EAST, Lima, Ohio. The invention relates to pipes, such as used in the construction of sewers and culverts. The object is to produce a pipe arranged so that the succeeding sections interlock with each other. Further objects are to prevent scouring under the pipe and to provide improved means for attaching the pipe to a bulkhead, such as found especially in culvert construction.

PROJECTING APPARATUS.—F. SCHWANHAUSSER, New York, N. Y. The inventor provides improvements in projecting apparatus, such as a combined dissolving stereopticon and a moving-picture apparatus, whereby only two lamps are required, one being capable of being bodily shifted in a lateral direction to assume an active position either for one of the stereopticon-lanterns or for the moving-picture apparatus.

METHOD OF MAKING CONCRETE SLABS OR BLOCKS AND APPARATUS THEREFOR.—W. R. STANTON, 2 Gonville Place, J. W. KNIGHTS, 67 Tenison road, and W. DRAKE, 4 Broad Street, Cambridge, England. The object in this invention is to facilitate the production of blocks and slabs by pressure or ramming in a mold; and to this end consists, essentially, in providing an improved form of vertical-sided collapsible core in conjunction with a separable mold for shaping the blocks and slabs, the core being so constructed that it may be withdrawn from the cavity of the block or slab without the necessity of the core being tapering in form.

CAP-FITTING.—W. C. TRUEX, Allentown, Pa. One purpose of this inventor is to provide a vase or cap-fitting for brass or iron bedsteads, newel-posts, and other devices where the above cap or vase may be used, which device is simple and economic in construction, capable of expeditious and convenient application, and when applied is entirely concealed from view.

EXCAVATING AND CONVEYING SYSTEM.—E. B. MERRY, Augusta, Ga. Mr. Merry's invention relates to systems for excavating various materials and transporting them to desired points in suitable receptacles. His principal object is to provide a simple and efficient system which will meet a wide range of requirements and be usable in many situations. By a slight rearrangement of the elements upon the frame the excavating-cable may be caused to operate at either side of tracks.

ELECTROCHEMICAL PROCESS OF PRODUCING NITROGEN COMPOUNDS.—J. W. WOOD, Moulton, Iowa. Mr. Wood's invention relates to an electrochemical process for producing nitrogen compounds. The process is conducted at ordinary temperatures. The electrolytic fluid around the anode is constantly drawn off by a siphon. The fluid is preferably renewed, by adding water thereto. The nitrogen which is constantly removed from the liquid is replenished by nitrogen of the air as said air passes in the form of bubbles upward through the liquid. A comparatively minute quantity of nitric acid may be used at the start, the air furnishing all of the nitrogen afterward needed.

PROCESS OF UTILIZING THE NUTRITIVE PROPERTIES OF MIDDLINGS.—S. B. APOSTOLOFF, 28 Bush Lane, Cannon Street, London, England. In this process the floury constituent of "middlings" (of whatever grade) may be extracted and utilized in breadmaking by introducing it into the kneading apparatus and therein incorporating it with the flour for the "batch." The process involves dissolving out the floury constituent from the middlings, adding yeast to the liquor and fermenting; straining the fermented liquor, so as to separate the bran or insoluble matter, and passing the strained liquor to the kneading trough for admixture with ordinary flour.

SAW.—S. J. GRAY and J. HORNING, Oakland, Cal. The arrangement of the joint while permitting sufficient flexibility in one direction will prevent bending of the links with respect to each other in opposite direction. By making the link substantially wedge-shaped in cross-section and placing teeth on the base of the wedge a strong link is secured with a smaller amount of metal than would be necessary with a link rectangular in cross-section. The wide edge of the link is adapted to withstand compression strain and afford a broad attachment for the teeth, while a narrow edge is sufficiently strong to resist a tension strain.

PERMUTATION-LOCK FOR BOTTLE-STOPPERS.—J. C. BOWERS, Boston, Mass. The lock comprises a casing carrying means for supporting the stopper, said casing having mounted therein a spring-controlled bolt, cooperating with which are a plurality of tumblers, which require to be brought into certain positions relatively to each other, by which to enable the lock and stopper to be removed. A dial-plate is employed for the lock, in association with which is a rotatable knob having special means for operating the tumblers to cause the bolt to become either engaged with or disengaged from a portion of the neck of the bottle.

PRINTING DEVICE.—O. D. SAFFORD, Passaic Park, N. J. While especially designed for printing columns, the device is particularly designed for printing names, addresses, and the like. The principal object of the invention is to provide for conveniently setting up words to be printed in such a way that they can be readily placed in alinement and readily removed from the printing device, so as to adapt it for those classes of business in which only a small number of impressions is required.

FIRE-ESCAPE.—J. A. REYNOLDS, New York, N. Y. This invention relates to a fire-escape or combined fire-escape and scuttle, the principal objects being to so construct a fire-escape in the shape of a ladder or stairway that it can be partially folded up out of the way and to connect it with a scuttle in such manner that the placing of the escape or stairway in a proper position will automatically open the scuttle, while the folding will close it.

TOBACCO-PIPE.—N. P. SHULIN, Butte, Mont. The object in this improvement is to provide a pipe arranged to keep fresh and clean, to prevent tainted saliva and nicotine from entering the smoker's mouth, and to prevent sparks leaving the pipe while smoking, thus rendering it perfectly safe to smoke the pipe at any desired place and without danger of setting fire to the surroundings.

SUBMARINE VESSEL.—S. NEVES, Valparaiso, Chile. One purpose here is to provide a vessel to contain one individual, who is supplied with atmospheric air from above the water level and have telegraph or telephone communication with attendants on the surface of the water, and to provide means for propelling the boat ahead, sternward, starboard, or port, or up or down, thus enabling descent to depths unattainable by ordinary apparatus, and whereby the person in the vessel having control can move in any direction, the bow being provided with bull's eyes, enabling the occupant to observe upon all sides of the vessel, as an electric light may be provided within.

ANIMAL-TRAP.—A. A. KELLOGG, Clinton, Mo. The invention refers to traps of the form commonly known as "cage-traps." It comprehends in its broad conception a trap having an adjustable tubular passageway leading from a suitable opening in the cage to its interior, means for adjusting the tubular passageway, a hinged door in the latter, and novel trigger and securing devices.

PROCESS OF HARDENING AND SOLIDIFYING OILS AND UNSATURATED ORGANIC COMPOUNDS.—A. KRONSTEIN, Karlsruhe, Baden, Germany. By this invention Mr. Kronstein is enabled to use any solidifying unsaturated organic compound similar to drying-oils other than wood-oil and in any proportions whatsoever, so as to obtain various grades of consistency from liquid to solid without use of a reducing agent and without fear of overstepping the desired degree of consistency and also to vary the time required for solidification. It is an improvement on this inventor's former patent.

FILTER.—A. L. JOHNS, Colorado Springs, Col. The structure is in the form of a barrel and is capable of being rolled for a sufficient time to cause ore therein to thoroughly mix, by which to facilitate and expedite chlorination of gold contained in the ore. The filter is of special construction, has means for securing the same in the bottom of the containing structure therefor, other means being employed between the filter and lining of said structure to prevent access of sand and the like to a chamber disposed beneath the filter for receiving from the latter the gold chlorid without admixture therewith of sand and slimes.

STORAGE-BIN.—G. H. WARREN and S. FONTAINE, Minneapolis, Minn. In this instance the invention relates to the construction of storage-bins, especially those used for the storage of grain and similar materials which must be kept free from moisture. The bin is provided with means for the circulation of air, and for reducing the possibility of a destruction of its contents by fire.

CASE FOR PHONOGRAPHIC OUTFITS.—M. HEMSTREET, JR., North Bergen, N. J. The object of this improvement is to provide means in which phonograph cylinders or records and the horn or trumpet may be conveniently packed and transported from place to place. This enables persons to carry the outfit conveniently and without danger of breaking the records. In attaining this end a case is provided having means for carrying a large number of records and also arranged to carry a telescoping trumpet or horn.

PAINT.—C. A. LUNDQUIST, Moscow, Idaho. This invention relates to paints used for coating various substances. It forms a hard coat of a character resembling that of cement, and it preserves wood or other surface from the action of rain or sunshine. It does not crack or peel off in the manner of paints of other kinds, and will stand for any length of time in any sort of weather.

CERAMIC PRODUCT.—M. M. MÉRAN, 155 Rue du Faubourg Poissonnière, Paris, France. The present invention has for its object a ceramic product constituted by magnesia silicates employed pure, but nevertheless presenting sufficient plasticity before firing and great strength when they have been fired. The first burning or the biscuit of this pottery may be provided with an appropriate coating or enamel.

GARMENT-CLASP.—J. H. GEISEL, New Rochelle, N. Y. Mr. Geisel's invention has reference to clasps for garments, it being especially applicable to the retaining in place of a belt, waist, and skirt. As its principal object it provides a compact and attractive device for this purpose which may be readily manipulated by the wearer and which will effectively perform its functions.

BUTTER-CUTTER.—G. ERICSON, New York, N. Y. The cutting edges are provided to be forced into the tub or mass of butter, thus forming a cake which is subsequently separated from the body of the butter by a cutting-wire or the like, the device being then withdrawn with the cake of butter thereon and being provided with an ejecting-plunger by means of which the cake may be delivered.

STAMP.—J. M. CAMPBELL, Lombard, Ill. The improvement refers to hand-operated stamps such as found upon desks in offices for the purpose of affixing dates or other printed matter to papers or envelops. The object is to provide a stamp with an inking device, to the end that the stamp or type may be inked quickly, neatly, and thoroughly, and so that a distinct and uniform impression will be produced.

VENTILATOR.—J. W. BE QUETTE, Platteville, Wis., and B. F. SACKETT, Toledo, Ohio. In this patent the invention relates to improvements in devices for giving ventilation to buildings or rooms, the object being the provision of a ventilator so constructed that the hot or foul air will readily pass out from the top or upper portion of a room and be replaced by fresh air. It is designed to be arranged in the wall of a building.

FOLDING UMBRELLA.—F. L. ATHERTON, Paterson, N. J. One purpose of the invention is to so construct the umbrella that the ribs can be permitted to remain at full length in opening and closing, operating at such time in practically the same manner as an ordinary umbrella, so that when it is closed the ribs will automatically fold outward upon themselves, reducing the body portion of the umbrella to about one-half of its length. It may easily be placed in a medium-sized hand-bag.

CIGAR-CASE.—M. NIELL, New York, N. Y. This improvement pertains to a cigar case or similar receptacle, the principal objects being to provide a combination lock and cigar cutter and to improve articles of this character. The construction provides a most convenient and effective locking and cigar-cutting operation without the use of a large number of movable elements.

LOCK FOR BAG-FRAMES.—L. B. PRAHAR, New York, N. Y. One purpose of the inventor is to provide a lock carried by one member of the frame, usually the central member, which will receive and fasten the other frame mem-

bers in closed position in such manner that either outer frame-member may be released without disturbing the locking connection between other frame members, and so that at will both of the outer frame members may be simultaneously released, completely opening the bag to which the frame is secured, both outer members when closed being self-locking.

Hardware.

LOCK.—G. FAIS, New York, N. Y. A combined bolt and hasp is employed having movement within a case, as well as through holes or openings formed in a door with which the lock may be associated, said case having a beam on the door, and being provided with a catch for engaging with the bolt and preventing the latter from being moved outwardly or withdrawn after proper manipulation thereof for effecting locking engagement with the hasp of one of the usual handles of a milk-can or the like.

NUT-LOCK.—I. J. GRIFFIN, Ossining, N. Y. In this case the object is to provide a new and improved nut-lock arranged to allow convenient screwing up of the nut on the bolt to the desired position, to securely hold the nut against accidental return movement, and to permit the operator to unlock the nut for unscrewing the same whenever it is desired to do so.

Heating and Lighting.

CHIMNEY-COWL.—C. T. MILLER and D. B. STORCK, Battle Creek, Iowa. The cowl is formed from a single piece of metal, and the same is of special construction by which wind striking it from any direction is caused to be utilized as an accessory in educting the smoke and other products of combustion from the chimney in connection with which the cowl may be employed. The structure may also be formed of two pieces of metal, each practically a duplicate of the other, the two pieces being cut out and struck up to the desired form, so as to present substantially the form of the first piece of metal.

ILLUMINATING APPARATUS DESIGNED FOR USE IN FLASH-SIGNALING.—A. ROSENBERG, 259 High Holborn, London, England. The object in this case is to provide self-contained apparatus capable of being packed away in a small compass when not in use and wherein, as compared with other similar apparatus, first, a larger proportion of the light may be utilized; second, the projected beam of light will have a relatively greater range of transmission or penetrative power coupled with diminished liability of signals being read by persons for whom they are not intended. The invention relates to apparatus for optical signaling, but applicable also as search-light apparatus.

INCANDESCENT GAS-LAMP.—L. T. ALTON, New York, N. Y. The invention provides a check and air-mixing chamber and also an additional air-chamber which surrounds the mixing-chamber and permits a supply of pure air—that is, air free from gas—to be directed against the inside of the mantle in predetermined quantities, whereby a more complete combustion is had, and a larger mantle may be heated either to incandescence, if the mantle is to be used for lighting purposes, or to a lower degree if the burner is desired for heating purposes only.

TIME GAS LIGHTING AND EXTINGUISHING APPARATUS.—T. F. WESTENHOLZ, Hellerup, Denmark. This device comprises an hour-dial, a lifting-hand movable over the dial, an extinguishing-hand movable over the dial, a spindle on which both hands are mounted, a pinion, a releasing-lever for engaging the pinion, a lever having a blade-shaped stop, a pin, a wheel on which the pin is mounted, arms, and devices in which said arms are designed to engage to stop the motion of the lighting and extinguishing mechanism. It is to be employed in street-lamps and houses especially.

Household Utilities.

STOVE.—F. A. BUCK, Hubbardston, Mich. In operation the damper is lowered to close communication between the rear flue and the smoke-vent while the fire is kindling, making direct draft from the fire pot through the smoke-consuming chamber into the vent. Well kindled, the direct draft may be shut off by raising damper to close communication between upper part of stove and vent, thus forcing heated gases down through the front flue, the base-flue, and up through the rear flue. Draft in either direction may be regulated by check-drafts. Magazine lightly covered, all draft must be through the opening between the baffle-plate and the front lining-section.

MOP-WRINGER.—R. CHRISTENSEN, Ogden, Utah. The intention in this improvement is to provide a wringer which forms a permanent fixture of a pail or like receptacle and is arranged to permit of conveniently placing a mop in the wringer to wring out the mop and to cause the dirty water to pass into the pail without splashing the water upon the floor during the wringing operation.

WATER-CLOSET BOWL.—A. W. HOWE, Honolulu, Hawaii. In the present patent the invention has reference to water-closet bowls; and the object is the production of a bowl with which a cuspidor is incorporated, to the end that the cuspidor may be automatically cleaned. The device is very sanitary.

DETACHABLE SUPPORT FOR IMPLEMENTS AND OTHER ARTICLES ON STOVES.—F. B. SMALL and J. C. MULLIGAN, Bath, Me. The object of the improvement is to provide a device and means for detachably clamping it upon the border-flange of a top plate on a stove or range, and affording very convenient means for holding implements used at a stove for ready removal. It provides means for supporting plates or other dishes, adjacent to or over the stove to warm them, and a support for towels to or above the stove to dry them.

EGG CUP AND CUTTER.—E. N. GAILLARD, New York, N. Y. The cup and cutter is arranged to prevent soiling of the hands or tablecloth by securely and neatly holding a boiled egg in position to allow of conveniently cutting off the top portion of the egg by the use of knives in a hinged cover, retaining the cut-off portion within the cover when swinging the latter over to allow free access to the opened-up egg and readily receiving any drippings from the egg.

POTATO-MASHER.—C. C. NAEVE, Portland, Ore. The material to be pulped is introduced through the hopper into the feed-chamber. The crank being revolved this material is forced by the screw, with the assistance of the ribs, longitudinally of the chamber and against a perforated plate, through the openings in which it passes into the mixing-chamber, thus receiving its preliminary division. Here it is subjected to the action of heating-fingers, which reduces it to a creamy state. Milk or other fluid, and condiments, may be delivered from the reservoir into the pulp and mingled therewith, the mixture being finally discharged over a chute. Means are provided for readily cleaning the apparatus.

Machines and Mechanical Devices.

TYPE-WRITER.—A. H. HOGEN, Geddes, S. D. An important object in this invention is to do away with the keyboard now ordinarily used and the delicate connections with which it is usually provided. The invention comprises means for accomplishing all of the results obtainable on high-priced machines of a complicated nature, these being obtained by means which render it possible to build a machine that will have very few delicate and easily broken or deranged parts and at the same time will be capable of being built at a low cost.

DEVICE FOR PAINTING OVERHEAD WIRES.—G. WELMAN, New Orleans, La. By this device overhead wires, especially insulated feed-wires, may be given a coating to preserve them from the elements of the weather. It is designed to be operated from the ground and to apply a coating of paint or other preservative in an effective, rapid, and economical manner. It is so constructed that the paint can be automatically applied and evenly coated by cheap labor and without danger to life or limb in its application.

ATTACHMENT FOR PLANERS.—J. H. BAUER, New York, N. Y. The invention pertains to an attachment for planers and similar machine-tools adapted for modifying the ordinary operations performed by such tools. The principal ways Mr. Bauer modifies the operations are to turn the work so as to provide for cutting a screw-thread on it and to move it on the support upon which it is mounted in such a manner that the stationary tool past which it moves will make a cut having a curved or slanting inner surface. The device will cut a molding of any kind in a column.

VARIABLE-SPEED DRIVING MECHANISM.—R. M. RUCK, 44 Thurloe Square, South Kensington, London, England. The principal object of the present invention is to provide means for enabling the pinion member of the mechanism to be shifted lengthwise of the cone by hand under automatically-acting control instead of by automatically-actuated mechanism under manual control. The invention relates to that type of variable-speed driving mechanism which is described in an application for Letters Patent having Serial No. 310,696.

MECHANICAL MOVEMENT.—W. F. MURPHY, Long Branch, N. J. The invention consists in the combination of a driving-shaft connected to a driven shaft through a driving-disk with intersecting guide-grooves in its face traversed by guide-blocks, a cross-head connecting the blocks and a crank-shaft on the driven shaft at one end and to a counter-shaft geared to the driven shaft by cranks and a link at its opposite end. This movement will be found desirable in boats and locomotives.

TRANSMISSION GEAR.—W. L. BUCK, New York, N. Y. The invention relates to mechanism for transmitting rotary motion at different speeds and in opposite directions. It is applicable to various uses, notably in automobile transmission and for transmitting from gasoline motors in marine propulsion. Change of speed and direction is accomplished by the relative movement of gears, which are meshed the periphery of one gear against the face of the other.

COMBINATION-GAGE.—J. D. CANN, New Castle, Pa. The purpose of the invention is to provide a combination-tool or universal machinist's tool whereby the gage, bevel, or angle of any piece of work may be quickly and accurately determined; and the purpose is to construct such a tool of three main elements capable of use independently or in combination.

MACHINE FOR RESHAPING BOTTLE-CAPS.—G. G. GLENN, Gastonia, N. C. In the present patent the object of the invention is the provision of a simple and practical machine for reshaping previously-used crown-caps for bottles and at the same time inserting new cork disks therein. The inventor has found that the bottle-caps may be used as a rule four times to advantage.

WIRE-FENCE MACHINE.—H. J. GARDNER, Montpelier, Ohio. With a single revolution of a crank the stay-wire is given two complete wraps, or more if desired. The second coil passes over the first, providing a lock. Means are provided for folding the machine into small compass, easily transportable. A double cutter saves much time in severing the wire, which is ordinarily done by hand with nippers. A stronger fence results from wrapping the stay-wires in opposite directions than when wrapped in the same direction, since in the first case they serve as braces for each other and not so easily displaced.

BRICK-MACHINE.—C. E. POSTON, Crawfordsville, Ind. Mr. Poston's object is to provide means for giving to the bricks unique and novel faces and ends as distinguished from known smooth or glazed faces. Rough-surfacing is desirable for a variety of reasons, among which are more ornamental appearance and a better bond when laid. This invention provides means for producing it without hand-labor and the use of "brooms" or other devices.

EXERCISING DEVICE.—F. PÉLISSIER, Gonaives, Haiti, W. I. The device is intended especially to be used by musicians for the purpose of manipulating the knuckles so as to increase their flexibility. The object of the invention is to produce a device which will afford means for giving the fingers of the hand a movement at the joint and to provide such arrangement as will enable various relations between the movements to be produced. It may be used by paralytics, or persons whose hands are attacked by numbness or stiffness at the joints.

CENTRIFUGAL FILTER.—R. E. LEE, Franklin, La. In the present patent the invention has reference to centrifugals or centrifugal filters, and the object of the improvement is the provision of a cylinder or drum of such construction as will enable the same to be readily adapted to machines of slightly-different sizes. The cylinder is of very simple construction.

FABRIC-HOLDING FRAME.—H. HOCHREUTENER, West Hoboken, N. J. One purpose of the inventor is to provide a frame adapted for use in connection with what is known as "Swiss embroidering-machines" and to so construct the frame that any desired number of retaining devices may be employed, which devices are simple, light, and strong, and so that by their means any desired number of pieces of fabric may be quickly and conveniently stretched and firmly secured in their stretched position without danger of injury to the goods.

METHOD OF LUBRICATING PNEUMATIC MACHINERY.—E. A. EMERY, Cripple Creek, Col. The inventor employs a lubricant of a solid nature and utilizes a current of compressed air as the vehicle by which the lubricant is carried to surfaces desired to lubricate. The most potent factor in dissolving a charge of solid or pressed lubricant is the action of moisture present in the current of compressed air on the charge, and he places the lubricant charge in such proximity to the path of the current that the moisture therein will have access to the lubricant so as to dissolve the latter gradually and slowly. The lubricating solution thus formed is conveyed in the air-current to surfaces of the machinery.

LUBRICATOR FOR PNEUMATIC MACHINERY.—E. A. EMERY, Cripple Creek, Col. In the present invention Mr. Emery employs a construction adapted to contain a "cartridge" or charge of solidified oil or grease treated to make it soluble when attacked by moisture, and around or adjacent to this cartridge the motive fluid is caused to circulate, so that the cartridge is caused to dissolve by its affinity for the moisture in the motive fluid, whereby the lubricant is taken up by the current of the motive fluid and carried into the machine or parts it is desired to lubricate.

WRITING-MACHINE.—J. B. VIDAL, Havana, Cuba. Mr. Vidal's invention has reference to a writing-machine, and the object of the improvement is to construct a writing-machine which will be capable of attaining a speed equal to that of an expert stenographer. Two sets of keys are used and when operated there is no danger of a finger touching the wrong key, and mistakes are thereby avoided.

FLOAT MECHANISM.—P. S. MAURITZEN, Port Richmond, N. Y. In this case the invention relates to float mechanism adapted for use in connection with intermittent flushing apparatus and with pumps or siphons for periodically emptying catch or drainage basins. Its principal objects are the provision of a simple and effective mechanism of this character.

Prime Movers and Their Accessories.

STEAM PUMPING DEVICE.—E. C. POLLARD, Seattle, Wash. The entire apparatus may be built of standard pipe-fittings, except nozzle and inclosing screen. As an engine it is believed that this apparatus comes as near to fulfilling Carnot's law of the perfect heat-engine as any devised. Downward pressure of the column of water being lifted, which is due to the action of the vacuum, it is not to be considered as a loss of energy, because it is balanced by the upward flow of the water through the suction-pipe, which is due to the same cause.

VALVE-GEAR.—W. HARTMANN, 64 Augsburgerstrasse, Berlin, Germany. The invention relates to valve-gears for use on steam-engines, gas-engines, and other motors. The present invention enables Mr. Hartmann to dispense with the rocking arm actuating the valve-lever by using a detent mechanism which alternately connects the valve-lever with the driving mechanism and locks the valve-lever during the period in which the valve is closed.

CARBURETER.—O. H. HINDS, Le Mars, Iowa. The invention is an improvement in gas-machines or carbureters wherein atmospheric air is utilized to take up the vapors of hydrocarbon liquids—such, for instance, as gasoline; and the invention has for an object the provision of means whereby the amount of gasoline taken up in the air to enrich the gas may be varied without varying the volume or pressure of the air.

ROTARY EXPLOSIVE-MOTOR.—S. DENTON and E. S. VEEN, Great Falls, Mont. A circular cylinder is connected with a rim by means of radial pockets, the whole constituting a fly-wheel, and the pockets carrying radially-movable abutments which co-act with a stationary piston carried by a stationary shaft, on which the cylinder is mounted to turn, and the shaft and piston provided with ports for the inlet and exhaust of the motor fluid.

VAPORIZER FOR HYDROCARBON-ENGINES.—C. F. PEARSON, Chicago, Ill. The special object of the present invention is to provide means for effectively regulating the vaporizer so as to increase and diminish the supply of fuel, this regulation taking place without, however, affecting the uniformity of the fuel mixture supplied to the engine. It constitutes an improvement in the type of vaporizer disclosed in a prior patent granted to Mr. Pearson.

Railways and Their Accessories.

SWITCH-OPERATED SIGNAL-LIGHT.—G. W. JORDAN, Purvis, Miss. When the switch is closed the electric lamp will flash, thus notifying the engineer that the switch is in proper shape. When, however, the switch is open, there will be no flash, thus giving warning that all is not right at the switch. By arranging the lamp to operate when the switch is closed liability of error from defects in the apparatus is eliminated, since it is apparent that failure of the signal to operate for any reason, will indicate "danger" to the engineer.

DERAILER.—T. W. LINN and J. H. PATRICK, Clymers, Ind. This device is for use in derailing railway rolling-stock. It may be used on sidings to prevent cars on the siding from accidentally entering the main track or at a railway-crossing to prevent cars from running onto the crossing when the signal is set against them. A feature is the provision of a shield for protecting the device from snow or rain and from dirt, also the provision of means on the derailer for cutting through and clearing away any ice, snow, or dirt which may have accumulated between the rail and the derailer.

CAR-COUPLING.—P. D. SERRURIER, Savanna, Ill. The purpose here is to overcome the delays to trains caused by the breaking of the draft devices. Generally the part which breaks is the lug holding and forming a pivotal support for the knuckle. The coupling is so constructed that when the lug is broken it may be removed and a new one applied without disturbing the draw-head proper. To this end the coupling is made in two sections, one the "draw-bar" the other the "removable draft-section," the latter being so fitted to the draw bar that it can be removed therefrom when it is desired to replace it with another.

EMBEDDING FOR STREET-CAR RAILS.—F. MELAUN, 9 Hardenbergstrasse, Charlottenburg, near Berlin, Germany. A pavement constructed according to the process in this invention can be submitted to driving as soon as finished. In case work has to be done on the rails later on, the asphaltum cover is first removed on the particular places and the inserted stones are then taken out one by one. The taking or lifting out is effected by lifting devices, and for this purpose the stones are provided in course of construction with iron rings.

RAILWAY-RAIL.—C. W. LANDERS, Genoa, Neb. The object of the improvement is to produce a rail of great strength and durability and which will be reversible in character, so that either face of the rail may be used as the tread or head. This railway-rail is very rigid and its capability of reversal when worn increases the life of the rail.

CAR-DOOR LOCK.—B. B. ROSS, Albany, N. Y. The intention is to use this improvement for locking the doors of milk-cars and while it is especially applicable in this connection, it may be applied to doors of other constructions. The object is to produce a lock of simple construction which is always held in a fixed position, so that it cannot swing against the wooden parts of the door-frame or door to cause damage.

RAIL-JOINT.—E. P. WINGREN, Denison,

Tex. The object here is to provide a joint arranged to securely unite the meeting ends of adjacent rails with each other to allow expansion and contraction of the rails without their sliding on the joint, thus preventing wear, to insure lateral alinement of the rails, to effectively resist the flange thrust on curves, and to allow the convenient use of the device on steam and electric railways.

Pertaining to Recreation.

SKATE.—T. Spacie, Houston, Texas. Mr. Spacie preferably provides the skate with a foot-plate, but embodies in connection therewith substantially similar devices for attaching the skate to the sole and heel of a shoe, as described in former Letters Patent granted to him. Special means are used for securing to the under side of the foot-plate the forward set of rollers for the skate, and other special means are employed for also attaching to the under side of the foot-plate the rearward sets of rollers employed for the skate.

PUNCHING-BAG. — C. McKenzie, Butte, Mont. The invention is an improvement in bags, such as are used for practice in boxing and exercising. The apparatus embodying the invention includes two bags which are so suspended and adapted to revolve and swing laterally in vertical planes as to afford special advantages for instruction in boxing and exercise in general.

CONFETTI - CANNON. — R. Kliemandt, Mount Vernon, N. Y. The device is for use upon social occasions and for amusement for the purpose of scattering the substance known as "confetti" over floors and tables and over the persons of participants in various social functions. The invention relates more particularly to a miniature cannon or mortar for causing the confetti or analogous substance to be scattered by means of an explosion.

CARRIER FOR GAME.—J. M. Paul, El Paso, Texas. One purpose of the inventor is to provide a device for carrying game adapted to be worn across the shoulders and held in place by the weight of the load. Another, is to so construct the device that moderately large or small game of all kinds in large or small quantities may be expeditiously, conveniently, and securely placed in position in the carrier and carried with comfort without injury to the game.

Designs.

DESIGN FOR A BOTTLE. — G. Buton, Bologna, Italy. In this original and ornamental bottle the inventor produces a design the length of which is about evenly divided between the neck and body portion. The latter is plain in outline, but the neck at its center is gracefully and slightly increased in diameter.

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Inquiry No. 8298.—For manufacturers of wood-turning machinery, such as machines for making bungs for beer barrels, also wooden corks, also spigots.

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Minerals sent for examination should be distinctly marked or labeled.

(10085) C. S. J. asks: I wish to learn the cause of trichinæ in pork. A. The trichina spiralis is a worm, a parasite of the hog. It is often found in great numbers in the flesh of these animals, in the encysted condition but still alive. If such meat is eaten without cooking thoroughly, the parasite is taken into the body and is rapidly propagated. The worm came originally from the rat. As hogs eat rats, they pass into the hog and thence into man. The only preventive is thorough cooking. This kills the trichinæ. No rare or underdone pork should ever be eaten. The risk is too great. The cost of immunity is so little, that anyone may be safe. Cook all pork thoroughly. 2. The cause of ptomaine poisoning by eating pork. What causes the presence of the poison, how the poison can be prevented, and whether or not there is any way of detecting the presence of poison before using the meat? A. Ptomaines are formed by decomposition. If only fresh food is used, one will be safe from these poisons.

(10086) H. S. N. asks: I have been a reader of your paper for several years, and always enjoy reading it. I should like to submit a problem for solution. The problem is this: Several years ago I took a picture of a fast train while running, a Michigan Central flier, at a point about two miles east of Decatur. On development the plate showed a blur of 1-32 inch, i.e., the pilot did. I used a Vive extra rapid plate; the focus of the lens was 6 inches; the distance of the engine, the pilot, from the camera, 50 feet; the length of exposure, 1-100 of one second; camera was placed at an angle of 15 deg. with the track. What was the speed of the train? The camera was a Vive, 4¼x4¼, meniscus lens. A. The solution of your problem of the speed of the train is not difficult, at least so far as a sufficiently close approximation is concerned. Start with the fact that the image of the pilot moved 1-32 inch during exposure. Since the lens is 6-inch focus and the pilot is 50 feet away, the pilot moved across the line drawn through the center of the lens, 100 times 1-32 inch, or 3.125 inches, since 50 feet is 100 times 6 inches. And since the camera made an angle of 15 deg. with the track, we must divide the 3.125 inches by the sine of 15 deg. to find the distance the pilot moved during the exposure. This gives 12.07 inches as the distance the train moved in the time of exposure, or 1-100 second. In one second it moved 1,207 inches, or 100 feet 7 inches. This is a speed of somewhat over 71 miles per hour. As we said above, this is an approximate solution, but still not far from the result which an exact solution would give.

(10087) J. S. M. asks: Will you kindly answer in your column of Notes and Queries the inclosed questions relative to Roman computation? I suppose the matter is simple enough, but I have never come across any work explaining it, nor any person whom I have asked who could throw any light on the subject. A. Very little is known concerning the method by which the Romans used their very inconvenient notation for performing the ordinary calculations. They are supposed to have used the abacus for all except the most simple problems. This instrument is in common use now by all Chinamen, and it is not difficult for any one to see it used wherever these men may be found. A description of the abacus may be had from any encyclopedia. There was a rod for each denomination of numbers to millions, seven rods each carrying five balls. Another set of short rods corresponded to these, and had one ball sliding on each. They could thus count by fives and carry by tens. Other rods supplied their need for calculating ounces. Further than this their business did not require them to go; they never needed to divide the distance of the sun by the velocity of light. They died in total darkness in regard to both of these data of the universe. As we said at the outset, we do not know the detail of the method by which the Romans made their calculations. Their mode of writing numbers was not like ours by placing like denominations in the same column, but each letter had its significance, and each number could be added by itself on the abacus, since each rod meant a denomination.

(10088) A. N. says: 1. I have seen it stated frequently that a single "ground" on a metallic circuit, while a source of danger, does not impair the transmission. If the potential at a "ground" is 5,000 volts, for instance, does this not mean 5,000 volts above the zero potential of the earth? If so, why does not all the current, if the resistance at the "ground" is low, flow to earth and equalize? A. A single ground on a metallic circuit does not impair the transmission as you state. The amount of electrification that passes to the earth is so small, and the capacity of the earth is so great, that it would take practically an infinite period of time to change its potential. 2. Standing on the ground, can a person touch with impunity one wire of a high-potential circuit if the circuit is free from "grounds"? A. If there was no ground, and no chance for the current to jump and produce another ground, there would be no injury to you in touching a high-potential circuit, but such a condition practically never exists on outside circuits. 3. About what is the resistance in ohms of the human body? A. This varies with the person, the points where contacts are made, and the condition of the flesh where these are made, but it is approximately 2,000 ohms. 4. What is the minimum strength of current the human body can endure? A. You probably mean the maximum. This also varies with the person, and the condition of the body, from 0.5 to 1 ampere.

(10089) F. J. M. says: Will you please answer the following questions through Queries column of your paper: 1. What is a Faradic brush? Please give a short description of it. A. We believe you refer to the brush made of wire bristles, which are connected to one terminal of the coil, while the other terminal is connected to a plate on which the hand rests, thus sending the current from the coil to the brush, the head, and back to the coil through the hand. 2. Does it make any difference what kind of cells are used in connection with a physician's coil? A. Any kind of battery can be used. A good form of dry battery is the most convenient. Always give full name and address, as we might wish to answer your query by mail.

(10090) F. G. says: Please print formula for making a vibrator jump-spark coil for a 3-horse-power engine. A. Scientific American Supplement, No. 1402, price ten cents, gives full directions for winding induction coils of various sizes. One giving a spark 1 inch long would be large enough for your purpose.

(10091) J. B. A. says: Is there any cheap way one can fix a camera so as to make a picture direct on bromide paper, so that you will not have to make a negative, then a print? I thought that there might be an arrangement attached to the lens, so as to change the image on the ground glass, so that when you develop the negative it will appear like a positive. If an arrangement of this kind can be made, will it decrease the light coming through the lens, and how much? A. There is no arrangement by which you can obtain a positive by exposing the bromide to the object through a lens. The negative differs from the positive in other respects than in the inversion of the image. The tintype process appears to do this, but if you look at it carefully you will find that the positive is a perverted image of the object. We fail to see any advantage in such an arrangement, as duplicate copies could not be obtained. If you increase the number of lenses through which the light passes, the image will not be as bright.

(10092) W. D. W. says: Will you be kind enough to answer the following questions for one who is anxious to know and who has the greatest respect for your opinion on scientific matters? 1. Will electric wires, furnishing current for arc lights coming in contact with street trees, injure them, that is, when the insulating covering has worn off from rubbing against the branches of the tree? One of the tree and park commission of this city (Columbia, S. C.), a college professor and a very intelligent gentleman, insists that the electricity, that is, all that is taken by the tree in wet weather, will do no harm, while I hold to the opinion that it will ultimately kill it, and I wish to know which one of us is wrong. A. We have found by experience that leakage from electric arc light wires does injure the limbs of trees, particularly when the difference of potential is very great, although we do not believe it would kill the tree unless it was very young. 2. When a tree has been killed by escaping electricity, how long a time should elapse, in case the leak be located and stopped, before it will be safe to put another tree in its place? A. We see no reason why another tree cannot be put in at once if the ground has been removed. 3. Some very large oaks that are exposed to the smoke from the railroad workshops have died very recently, and I am anxious to know if the smoke is responsible for their dying. The shops have been there for a long time, and it seems that if the smoke is the sole cause the trees ought to have died long before this time. It may be possible, however, that loss of vitality on account of age may be partly responsible for their dying. A. If the trees are very close to the top of the smoke-stacks, we have no doubt that the trees have lost some vitality on account of it, as the products of combustion are very destructive to vegetable life, but the trees would have to be under the direct influence of the smoke.

NEW BOOKS, ETC.

Lloyd's Register of American Yachts. 1906. By the Committee of Lloyd's Register. New York: Lloyd's Register of Shipping, 15 Whitehall Street. 384 pages. 35 colored illustrations of flags of the United States and Canada. Price, $7.50.

It was as long ago as 1874 that a small but complete volume containing the register of yachts was issued in New York. Since that time, publications of a like character have been local, rather than national, in scope, confining themselves to the larger yachts and clubs of the Atlantic seaboard only. In 1877 the Committee of Lloyd's Register of British and Foreign Shipping was requested by British yachtsmen to classify yachts after the same plan as merchant vessels. The work thus begun continued to the present time. In 1902, in response to a demand from American yachtsmen, the committee issued a similar Register of American Yachts, which has been continued annually to the present date. In the present volume for 1906, an entirely new plan has been adopted in the arrangement of the work. The introduction of other types of motor than the steam engine has removed the necessity for dividing yachts into two divisions, steam and sail. Consequently, all yachts in the present volume are grouped in one alphabetical list. The almost universal use of the internal-combustion engine has called for a more complete description of this type, and the diversity in hulls has called for new particulars descriptive of the details of houses and cabins. In quality of paper, type, and illustrations, this excellent work is fully up to those which have annually preceded it. The first 260 pages consist of the register, which gives the full particulars concerning the construction, rig, leading dimensions, designer, builder, and place and date of launch, the machinery, the owner's name, and the home board of registry. Particularly handsome are the thirty-four colored plates, giving the flags of yacht clubs and the flags of private owners, following which are the particulars of the American and Canadian yacht clubs, lists of yacht designers, engineers, builders, etc., also an alphabetical list of yacht owners.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending July 31, 1906.

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

Adjusting and fastening ring, C. Schmidt	827,267
Aerodrome, J. B. Kramer	827,157
Air brake, W. H. Collins	827,421
Animal head, artificial, F. Frankl	827,357
Animal trap, J. J. Crowson	827,215
Awning hood, S. H. Voorhees	827,483
Bag frame lock, L. B. Prahar	827,563
Bandage and dressing retainer, suspensory, J. L. Boehm	827,207
Bars of stock, mechanism for feeding, Pearson & Roberts	827,660
Battery, alkaline, T. A. Edison	827,297
Bearing, roller, J. M. & S. D. Horger	827,638
Bearings, making adjustable, F. Wolfsjager	827,135
Bearings, mold for babbitting, C. Remelius	827,466
Bed rests and chair backs, armpit crutch for, A. S. Turner	827,125
Bedclothes clamp, I. B. Nickles	827,260
Bell, electric, E. J. Burke	827,077
Binder, loose leaf, F. Egge	827,298, 827,299
Binder, loose leaf, J. S. McDonald	827,461
Binder, temporary, W. S. Mendenhall	827,697
Biscuit making machine, G. Herbert, Jr	827,444
Blackleading machine, W. H. Nicholas	827,557
Blast furnace charging apparatus, W. Kennedy	827,155, 827,156
Block, sanitary disinfecting and deodorizing, J. T. Freestone	827,092
Block signal, safety, L. V. Greene	827,628
Boats, means for propelling and steering or guiding, H. Bachman	827,202
Boots and shoes, machine for paring and finishing, H. G. Rodges	827,570
Bottle holder, nursing, A. H. Oberg	827,559
Bottle, non-refillable, A. & D. Celenza	827,212
Bottle washer, J. T. H. Paul	827,388
Bottling machine, Ortmann & Herbst	827,262
Box blanks, machine for making wire bound, W. P. Healy	827,097
Box or carton setting up machine, W. S. Scales	827,671
Bracelet, self-closing, W. I. Macomber	827,164
Bracket hook, E. A. Graham	827,627
Brake head, G. A. Woodman	827,200
Brick, ornamental, F. Pedrick	827,464
Brush, fountain, B. D. Knickerbocker	827,376
Brush holder and sterilizer, tooth, D. M. Hitch	827,308
Brush, scrubbing, J. Baumruk	827,074
Bucket, automatic, Clukies & Hazell	827,080
Buggy top joint controller, Nimmo & Long	827,651
Butter cutter, G. Ericson	827,622
Butter cutter, P. Holmberg	827,634
Buttons, etc., chuck for holding pearl, L. W. Holub	827,309
Cabinet, A. J. Murphy	827,649
Cabinet for holding account books, W. E. Wright	827,340
Cables, clamp and support for telegraph and telephone, H. E. Sheeley	827,573
Cake depositing machine, E. Herisse	827,306
Calcining furnace, T. A. Edison	827,089
Cans and jars, machine for lining covers for, J. Brenzinger	827,414
Candles, lamps, etc., wick for, V. Pfersdorff	827,176
Car door fastener, F. L. Estes	827,352
Car door opener, L. D. Gibson	827,526
Car end bracing, H. W. Wolff	827,489
Car fender, J. V. Battram	827,602
Car handling and dumping apparatus, W. W. Keefer	827,373
Car, railway, G. H. Hopkins	827,446
Car, railway, H. S. Hart, et al	827,632
Car, railway ballast, H. S. Hart, et al	827,633
Car, self-propelled, P. H. Batten	827,408
Car stake, R. V. Sage	827,266
Car stake and brace, combined, J. C. Herrmann	827,307
Car step, C. C. Hummel	827,240
Cars, bolster for railway, O. W. Meissner	827,646

Cars, dumping and caging apparatus for mine, T. Fisher 827,354
Cars, stake for the sides of railway, T. R. Brown 827,501
Carbonating apparatus, F. Robbin 827,567
Carbureter, W. W. Grant 827,094
Carbureter, R. S. Lawrence 827,643
Carpet or rod holder, stair, D. Baltzer 827,073
Cart, snow loading and dumping, C. G. Ottersten 827,657
Cartridge, C. A. Bailey 827,600
Cattle stanchion, H. D. Elliott 827,221
Cement clinker by flame impingement and apparatus therefor, burning, C. Ellis .. 827,517
Cement, magnesia, E. Bidtel 827,286
Cement post for wire fences, O. Fleming .. 827,224
Cements, composition of matter to be used in making waterproof and polishable, Paul O. Krottnaurer 827,158
Ceramic product, M. M. Meran 827,550
Chair. See Hammock chair.
Chair, W. J. Fountain 827,225
Chair, M. F. Schrenkeisen 827,398
Cheese cutting machine, H. Gross 827,305
Cigar case, M. Niell 827,558
Cigar filler and preparing same, O. Tyberg .. 827,126
Circuit breaker, automatic magnetic, W. M. Scott 827,469
Cleaning apparatus, air, G. J. Kindel 827,536
Cleaning device, tooth, P. F. Roach 827,121
Clinker extractor, J. R. Place 827,561
Clock, electrically wound, A. De Vos 827,218
Clock striking mechanism, L. L. Volpo 827,275
Closet sanitary device, A. F. Lesler 827,162
Cloth on the bias, device for marking or cutting, S. Gould 827,233
Clutch, C. A. Sturtevant 827,475
Clutch, friction, G. E. Franquist 827,091
Clutch, friction, W. E. Magie 827,316
Clutch mechanism, friction, T. S. Miller .. 827,382
Coal chute, extension, F. S. Converse 827,349
Coal tipple, J. S. Pates 827,560
Cock and expansion valve, combined stop, F. W. Felsberg 827,521
Cock, curb, C. I. Wilkins 827,593
Coffin pedestal, W. R. Sparkman 827,578
Coil former, J. W. Lundskog 827,315
Coin tester for slot machines, M. D. Sadtler 827,327
Collar, E. L. Hoover 827,637
Collar fastener, J. A. Coyner 827,084
Collar, harness breast, T. D. Gordon 827,232
Collars, machine for folding turnover, Messer & Joslyn 827,253
Collector ring, H. Geisenhoner 827,360
Concrete pile, J. Kahn 827,535
Concrete structures, anchorage for, J. A. Brown 827,613
Condenser, N. P. Towne 827,479
Condenser, steam, A. Pennell 827,114
Controller and dimmer switch, combined, J. W. Pierce 827,663
Cord knotter and cutter, combined, J. E. Quinn 827,666
Core, W. P. Firey 827,223
Core making machine, W. H. Larrison ... 827,541
Cotton planter and fertilizer distributer, combined, A. C. Taylor 827,328
Cotton, treating, G. D. Burton 827,293
Counter, revolution, H. P. C. Browne 827,614
Cover, machine, R. A. Bostelman 827,412
Creaming can, H. A. Arvig 827,495
Crib construction, F. Simpson 827,186
Cross tie, sectional metallic, J. P. Ashby .. 827,343
Cultivator, W. C. Children 827,078
Cultivator attachment, C. M. Weempe ... 827,337
Current collector, Linden & Hiersemann .. 827,314
Current motor, alternating, M. Milch 827,319
Current tap and lamp socket, swiveling, C. F. Howes 827,310
Curtain fixture, E. F. Henderson 827,151
Curtain pole bracket, G. F. Tait 827,272
Curtain shade fixture, C. W. Moore 827,256
Cuspidor, W. C. Kirk 827,537
Cuspidor or spittoon, P. M. Freer 827,228
Dash pot, W. R. Whitney 827,339
Dental instrument, L. H. Crawford 827,507
Dental swaging apparatus, L. H. Crawford. 827,508
Desiccating apparatus, J. C. McLachlan 827,172
Disiccating or evaporating apparatus, W. E. Jaques 827,153
Desk and seat, combined, H. G. Lippard .. 827,245
Die stock, W. E. Brooke 827,209
Die stock, H. W. Oster 827,656
Dish pan, J. J. Meyer 827,168
Door securer, G. H. Foster 827,624
Doors, etc., registering locking bolt for, J. F. Pixley 827,177
Drill, S. A. Casparis 827,211
Drill grinding machine, Morgan & Heald .. 827,459
Driving mechanism, velocipede, A. Schaad-Voegeli 827,571
Dust separator and collector, combined, O. M. Morse 827,460
Dye and making same, ortho-oxymonoazo, K. Schirmacher, et al 827,468
Ear trumpet, C. W. Levalley 827,645
Earthenware, etc., pipe joint for, C. H. & E. H. Bentley 827,409
Eaves trough hangers, machine for forming, H. A. Gibbs 827,229
Egg beater, A. T. Stewart 827,474
Electric alarm, W. O. Rehn 827,120
Electric light support, O. C. White 827,199
Electric machine, dynamo, L. A. Tirrill ... 827,331
Electric machine, static, O. Bayedorfer 827,497
Electric signaling, J. B. Struble ..827,269, 827,270
Electric switch, G. W. Richardson 827,181
Electric switches, controlling, C. E. Eveleth 827,353
Electroplating cylindrical articles, apparatus for, R. C. Totten 827,478
Electrostatic separation, G. W. Pickard ... 827,115
Electrostatic separation, apparatus for, G. W. Pickard 827,116
Elevating jack, T. J. Cope 827,505
Elevator, A. J. Myer 827,109
Elevator and carrier, J. M. Boyd 827,609
Elevator plunger guide, J. A. Anderson .. 827,282
Elevator safety gate mechanism, W. D. Kehl 827,374
Engine. See Internal combustion engine.
Engine, E. A. Maynard 827,107
Engine steering mechanism, N. Dreis 827,429
Engine, valve gear steam, J. W. Davis 827,428
Envelop, return, D. T. Boston 827,208
Excavating device, J. Austin 827,406
Excavator, W. R. Martin 827,457
Excavator shovel, L. W. Connell 827,144
Exercising bag, W. G. Wood 827,490, 827,596
Eyeglasses, E. P. Sawtelle 827,185
Fabric scouring machine, woven, C. Wilmsen 827,594
Fabrics, machine for cutting weft pile, O. Drey 827,430
Fan and motor for operating the same by compressed air, J. L. Creveling 827,509
Fastener, sash cord, W. & W. F. Lear 827,103
Feed water heater, D. Halpin 827,631
Feeders, automatic stock compensating device for card, G. Geb 827,359
Feeding mechanism, ratchet, H. John 827,532
Fence machine, wire, C. F. Leonard 827,644
Fence making machine, J. Harris 827,364
Fence, wire, J. Harris 827,365
Fence wire stretcher, H. Murrell 827,257
Fencing, woven wire, C. Griswold 827,440
Fermenter, D. Gordon 827,148
Fiber material from animal tendons or sinews, manufacturing, S. Kohn 827,102
Filter, J. T. H. Paul 827,389, 827,390
Filter, centrifugal, T. S. Patterson 827,263
Finger ring expander, Boylan & Chamberlin 827,290
Fire escape, C. F. Davy 827,510
Fire extinguisher, H. W. Mix 827,255
Firearm, automatic, W. J. Whiting 827,488
Fireproof blinds, slat for constructing, H. E. Vance 827,676, 827,677
Fish, apparatus for catching, O. G. Bolitho. 827,076
Fish, preserving, W. Lamb 827,452
Float mechanism, P. S. Mauritzen 827,549
Floors laying patterned cement, E. Bidtel 827,287
Flower supporter, A. Heim 827,442
Fluid gage, M. Martin 827,318
Foldable stand, E. J. Whitlow 827,338
Folding machine, A. B. Dick 827,512
Folding table brace, P. F. Swart 827,673
Forging machine, O. Briede, reissue 12,515
Friction clutch for vises, lifting jacks, clamps, or the like, P. Broadbooks 827,612
Fuel compound, emulsion, W. F. Browne ... 827,139
Furnace, J. V. Martin 827,166
Furnace stock distributer, J. D. Pugh 827,118
Gaff hook, R. C. Livingston 827,246
Game apparatus, A. F. Gillet 827,626
Game board, roulette, W. W. Russell 827,670
Game maul, J. V. S. Paddock 827,658
Garment clasp, J. H. Geisel 827,525
Garment supporter clasp, J. H. & I. Taylor 827,273
Gas, apparatus for manufacturing, P. I. Cohen 827,081
Gas, apparatus for the manufacture of illuminating, C. W. Bilfinger 827,075
Gas burner, I. C. Daily 827,621
Gas generator, acetylene, A. F. Chace 827,503
Gas lighting and extinguishing apparatus, time, T. F. Westenholz 827,592
Gas machine, acetylene, F. P. Cave 827,348
Gate, A. W. Crigler 827,423
Gate, Nelson & Tribbey 827,555
Gate, F. A. Guth 827,630
Gear mechanism, engine valve, W. W. Guest 827,234
Gear, reversing, A. S. Reed 827,564
Gear, variable speed and reversing, H. W. Leonard 827,454
Gearing, change speed, Pearson & Roberts .. 827,175
Gearing, differential, E. P. Gray 827,095
Gin rib, F. D. Allgood 827,597
Glass, apparatus for shaping, F. L. O. Wadsworth 827,679
Glass machine, wire, R. W. Davies .. 827,427, 827,686
Glass, making prism, F. L. O. Wadsworth. 827,484
Grab, G. J. Hone 827,635
Grain cleaning machinery, F. W. Comstock 827,213
Grinding mill, A. W. Straub 827,579
Guide for sewing braid binders to skirts, adjustable slide, M. J. Giles 827,437
Gun, discharge actuated, S. N. McClean .. 827,259
Gun having recoil barrel and adjustable brake, K. Voller 827,678
Guns, automatic single trigger mechanism for double barrel, J. Kautzky 827,242
Hair retaining device, R. B. Osterhoudt .. 827,386
Hammock chair, Calbeck & Alder 827,417
Handcuff, F. E. Olcott 827,385
Harrow, W. E. McCann 827,110
Harrow scraper, disk, Kennedy & Sharp .. 827,375
Harvesters, boll opening and cleaning mechanism for cotton, Berry & Baumgardner 827,604
Harvesting machine, cotton, N. Bowditch .. 827,288
Hat and coat rack, Yutzy & Hyet 827,280
Hat and coat rack, H. S. Mills 827,551
Heading and bending machine, bolt, C. T. Robert 827,568
Heater. See Feed water heater.
Heater, Loudon & Hogg 827,379
Heating apparatus, steam, D. M. Nesbit .. 827,173
Heating device, chemical, Espenhayn & Hunger 827,222
Heating system, steam, F. J. Goff 827,231
Hewing machine, timber, W. K. Melton .. 827,251
Hog gambrel, self-spreading, C. N. Walker 827,196
Hoisting and conveying apparatus, F. W. Lovell 827,247
Hoisting machine, P. Bauch 827,204
Honing strop, G. R. Craw 827,684
Hook and eye, O. V. Hoopengardner 827,636
Hoop forming and splicing machine, N. K. Bowman 827,607
Horse rake, C. Hockin 827,098
Horseshoe, lock, W. Basjanoff 827,601
Hydraulic motor, J. L. Mariner 827,165
Hydrosulfite solutions, making, P. S. Clarkson 827,420
Indicator, Lighty & Betts 827,544
Insulating support for electrical conductors, W. K. Gibboney 827,361
Internal combustion engine, A. B. Goodspeed 827,302, 827,304
Internal combustion engine valve gear, A. B. Goodspeed 827,303
Iron or steel sheets, making copper coated, W. P. Lewis 827,378
Iron oxid scale, electrolytically dissolving, C. J. Reed 827,179
Ironing board, F. Hofacker 827,237
Jars and jelly glasses, fiber closure for, G. T. Reed 827,667
Jars and other vessels, closure device for, W. R. Greiner 827,096
Key, Ash & Sayles 827,201
Key ring, H. Smith 827,187
Keyless lock, G. W. Strong 827,191
Knitting machine, J. D. Hemphill 827,367
Lamp, incandescent gas, L. T. Alton 827,342
Lamp, intense light, P. Lucas 827,380
Land roller, W. H. Teaby 827,329
Land roller, S. Warner 827,587
Latch mechanism, H. G. Voight 827,335
Lathe dog, H. E. Clark 827,079
Lavatory apparatus, F. E. Wilkinson 827,278
Lawn rake and snow scoop, combined, R. F. Lawson 827,542
Lenses, making bifocal, C. N. Brown 827,500
Life preserver signal attachment, A. C. Crofford 827,350
Line holder and cylindrical type chase, F. W. Weeks 827,486
Line holder and type chase, F. W. Weeks. 827,485
Linotype machine, E. L. Holmes 827,238
Liquid raising apparatus, Young & Shaw .. 827,341
Lock, T. E. Pollmann 827,178
Lock, G. Fais 827,520
Lock, G. Veitch 827,583
Loom shuttle, J. P. Costello 827,082
Loom take up, S. W. Wardwell 827,130
Loom take up, narrow ware, S. W. Wardwell 827,129
Loom, weft replenishing, A. Walker, et al. 827,586
Lubricating apparatus, C. W. Manzel 827,381
Lubricator, A. A. Stelting 827,402
Magnetic separation, apparatus for, G. G. Bring 827,499
Mail box, J. H. Van Dorn 827,482
Mail carrier, F. S. Jolly 827,312
Mail delivering device, F. W. Renner 827,565
Mantel, adjustable, Holbein & Kinsey 827,369
Massage instrument, I. A. Weston 827,133
Match making machine, Shrady & Stivers .. 827,471
Match safe, B. S. Martin 827,248
Match safe, J. Roemisch 827,467
Mattress support, spring, J. M. Blocher .. 827,345
Medical device, F. Hofmann 827,099
Metal bending machine, J. McKay 827,553
Metal, machine for spreading slitted, S. B. Harding 827,441
Metal sheets or plates, apparatus for making corrugated, W. G. Causer 827,419
Metals, brazing L. L. White 827,134
Metallurgical furnace, G. H. Benjamin 827,498
Micrometer gage, Leach & Woodman 827,453
Milk, testing, O. Wendler 827,591
Milking machine, G. Hutchinson 827,311
Milking machine teat cup, F. A. Lane, 827,159, 827,160
Mill. See Grinding mill.
Mixing mechanism, E. F. Pumphrey 827,664
Mold support, D. A. Dodd 827,295
Molding machine, H. Tscherning 827,675
Molding machine, pipe, P. Campbell 827,616
Molding machine, pulp, G. R. Ward 827,128
Molding machine vibrator, E. E. Waite .. 827,127
Monkey wrench, pipe wrench, and bolt holder, combined, J. Mills 827,254
Motor control, J. E. Noeggerath 827,320
Motor starting device, E. Batisse 827,496
Motors, distant control of electric, H. F. Parshall 827,322
Movement transmitting mechanism, Pearson & Roberts 827,661
Musical instrument brace, W. Saighman .. 827,183
Musical instrument, mechanical, J. McTammany 827,384
Musical instrument, music sheet or paper for mechanically operated, T. W. Smillie 827,123
Nail driving implement, C. Prangemeier 827,392
Nest box, J. W. Edwards 827,516
Nest, hen's, A. Lucia 827,545
Nut cracker, J. B. P. Miller 827,648
Nut lock, B. Watts 827,198
Nut lock, R. H. Bowers 827,289
Nut lock, Pollock & Deruelle 827,562
Nut lock, W. Burton 827,615
Nut lock, I. J. Griffin 827,629
Observation tower, C. H. Cooley 827,214
Office dinkey, hotel, H. W. Browder 827,415
Oil cup, P. W. Shawver 827,470
Oil cup, automatic, J. A. Anderson 827,283
Oil or hydrocarbon burner, Hunt & Mirk .. 827,342
Oil well appliance, R. E. Grant 827,527
Ore, apparatus for conveying and cooling, H. F. Campbell 827,502
Ores, treating, F. J. Crane 827,620
Overshoe attachment, W. H. Tillson 827,330
Ozonizers, apparatus for mounting and cooling statical, M. Otto 827,387
Package, coffee, H. D. Terrell 827,581
Packing case, A. R. Speer 827,124
Paddle wheel, feathering, W. N. Cruchon. 827,216
Paint, D. J. Joslin 827,534
Paint, C. A. Lundquist 827,546
Paintings, producing copies of oil, H. Bogaerts 827,606
Paper machine, J. Walsh 827,197
Paper, etc., machine for cutting and delivering sheets of, C. P. Cottrell 827,422
Patterns from molds, apparatus for drawing, J. H. B. Bryan 827,416
Pedal and toe clip, combination, J. Fox ... 827,356
Pen, J. Schuchmann 827,393
Pen and pencil case, revolving, G. Kohlmeyer 827,539
Phonographic outfit case, M. Hemstreet, Jr. 827,528
Photographic shutter, G. Dietz 827,513
Photography, color, W. C. South 827,188
Photography, color, N. H. Hyde 827,241
Pick, W. G. Fine 827,432
Pipe connecting member, J. D. Tschopik, reissue 12,517
Pipe wrench, A. Meffert 827,458
Plane, L. D. Smith 827,473
Planter, seed, I. A. Weaver 827,131
Plow, W. H. McDonald 827,650
Plow attachment, H. D. Taylor 827,403
Plow colters, means for cleaning, Underwood & Mowers 827,334
Pneumatic machinery, lubricating, E. A. Emery 827,518
Pneumatic machinery lubricator, E. A. Emery 827,518
Pneumatic malting drum, F. B. Giesler .. 827,690
Pocket, safety, W. J. McCauley 827,258
Polishing mitten, Hills & Brevoort 827,530
Post hole digger, C. Butcher 827,682
Pot. See Dash pot.
Potato masher, C. C. Naeve 827,112
Powder strip cutting machine, J. T. Thompson 827,674
Power apparatus, compressed air, A. C. Eastwood 827,515
Power from waves, tides, or the like movements of water, means and apparatus employed in generating motive, J. Hutchings 827,639
Power transmission device for motor cars, etc., W. von Pittler 827,117
Press. See Seal press.
Pressure regulator, T. A. Mighill 827,410
Printer's and embosser's make ready, Harris & Kandle 827,366
Printing machines, means for supplying rolls of paper to web, R. C. Annand .. 827,072
Pulley, H. A. Bubb 827,346
Pulley block, J. M. Boyd 827,680
Pulley, sash, F. S. Clarkson 827,618
Pulley, self-lubricating, C. B. McKown 827,171
Pump, Betker & Snyder 827,205
Pumping engine, steam, J. A. Groshon 827,149
Rack. See Hat and coat rack.
Radiator box base, J. F. Geary 827,093
Rag shredder, C. W. Griffin 827,439
Rail and bracket, toe, D. L. Tschantz 827,194
Rail joint, W. D. McCurdy 827,111
Rail joint, J. M. Tadlock 827,476
Rail joint bridge plate, F. E. Abbott, reissue 12,518
Railway, electric, Stack & Burns 827,189
Railway, electric, G. W. Browne 827,681
Railway, pleasure, Lauster & Pounds 827,313
Railway signal system, W. E. Schieble .. 827,122
Railway switch, H. A. Rosback 827,395
Railway switch, W. W. Allen 827,405
Railway switch adjuster, automatic, L. C. Brown 827,138
Railway switch mechanism, T. Bamford ... 827,407
Railway tie and rail fastener, cement, R. Fullerton 827,436
Railway traffic controlling apparatus and system, H. Bezer 827,411
Railway traffic controlling system, C. J. Coleman 827,143
Rake. See Horse rake.
Range air heating attachment, E. R. Cahoone 827,210
Ratchet mechanism, I. M. Hackney 827,235
Razor stropping apparatus, J. Rheinberg .. 827,264
Recording mechanism, automatic, H. Darwin 827,086
Reduction machine, refuse, D. P. Carritte .. 827,617
Reel. See Wire reel.
Refrigerator box, B. S. Fryar 827,358
Resistance device, H. W. Leonard 827,455
Revoluble members, mechanism for intermittently rotating and stopping, Pearson & Roberts 827,662
Ring. See Collector ring.
Roasting furnace, H. W. Fox 827,226
Roasting furnace, F. E. Marcy 827,547
Roll, journal bearing, and the like, E. J. Francis 827,689
Rolls on their axles, clamp for fastening stone couch rolls and wet press, G. Renker 827,394
Roller. See Land roller.
Roof carline, G. B. Maltby 827,317
Roof gutter, sheet metal, Loeffler & Hazel. 827,456
Rotary engine, W. E. Weber 827,276
Rotary engine, L. A. Hicks 827,529
Rotary engine, W. H. Vaughn 827,582
Rotary engine, T. T. Bevan 827,605
Rotary explosive motor, Denton & Veen .. 827,511
Rubber articles, making hollow hard, W. W. Weitling 827,277
Rubber dam clamp and holder, combined, H. J. Hansen 827,236
Rule, folding, J. A. Traut 827,480
Rule, try square, and calipers, combined, E. L. Hoy 827,239
Ruler and blotter, combined, I. I. Sides .. 827,574
Saddle, G. C. Cox 827,506
Safe, S. A. Ely 827,351
Sand feeder, Knapp & Mulholland 827,450
Sash fastener, D. G. Saunders, Jr. 827,184
Sash fastener, C. K. Holmes 827,370
Sash, window, W. E. Daugherty 827,217
Sausage stuffing machines, indicator for, H. Ernst 827,147
Saw filer, M. L. Finger 827,623
Saws, adjustable rig for circular, J. H. Martin 827,548
Sawing machine, Holden & Hovorka 827,100
Sawmill feed, G. S. Sergeant 827,572
Scaffolding to iron joists, contrivance for the fastening of flying, W. Stieper 827,268
Scale and producing iron sulfate, electrolytically removing, C. J. Reed 827,180
Scale micrometer attachment, linear, A. F. Henrikson 827,443
Schedule or table, F. P. Leffingwell 827,161
Screw, adjusting set, R. J. Goeppinger 827,230
Screw machine, Pearson & Roberts .. 827,463, 827,699
Seal, bottle, S. Mathieu 827,106
Seal for bottles and other articles, W. A. Quick 827,665
Seal press, T. Wenk 827,132
Sealing closure for vessels, G. T. Reed 827,668
Seaming machine for sheet metal articles, Lindgren & Humelbuehler 827,163
Seeder and drill, F. La Bare 827,694
Self feeding furnace, W. I. Ely 827,146
Sewer gas trap, J. P. Putnam 827,324
Sewing machine, broom, A. E. Miller 827,169
Sewing machine take up, L. Onderdonk. 827,652 to 827,654
Sewing machine take up mechanism, L. Onderdonk 827,655
Sewing machines, chain stitch looper for lock stitch, A. G. Lamb 827,641, 827,642
Shade roller bracket, J. M. Rhett 827,669
Shade roller raising, lowering, and supporting device, W. N. Dunn 827,688
Shears, T. C. Smith 827,577
Shears for cutting metals, reversible, C. Horn 827,531
Sheets for tinning, making, W. P. Lewis .. 827,696
Shelving, knockdowns, G. Krahmer 827,540
Shoe holder, J. Petrillo 827,391
Shoe measure, G. G. Iberg 827,447
Shovel. See Excavator shovel.
Shovels and the like, boom guy for steam, W. Ferris 827,300
Shutter fastener, K. C. J. Hanselmann .. 827,363
Sign holder, street, F. P. Flowers 827,355
Signal apparatus, C. J. Coleman 827,683
Signal for steam railway and electric railway purposes, fog, C. G. Ritchey 827,566
Signaling apparatus, electric, J. W. Darrah 827,685
Signaling device, electric, P. Kennedy 827,154
Signaling for party lines, harmonic, W. W. Dean 827,087
Silver solvent, selective, F. J. Hobson 827,368
Siphon, beer, G. Piller 827,465
Skate wheel, roller, H. A. Kohler 827,451
Skewer pointing machine, G. K. Tyler 827,333
Sled propeller, J. McGillis 827,462
Slicer, fruit, C. M. Heffron 827,691
Snap hook, C. H. Billman 827,206
Soap and brush holder, A. M. Adams 827,493
Sock or stocking, Hubel & Sollhuber 827,152
Spacing and marking device, E. West 827,487
Sparking device, W. W. Morse 827,108
Speed indicator, R. B. North 827,261
Speed mechanism, variable, A. W. Pupke .. 827,119
Spirits of turpentine, digester for extracting, F. D. McMillan 827,554
Spool holder and thread cutter, H. Donnelly 827,220
Spoon, strainer, C. Hutchins 827,101
Spraying machine, J. W. Patterson 827,174
Spring power motor, W. J. Meyer 827,647
Stacker and loader, hay, C. J. Dlouhy 827,219
Stamp, J. M. Campbell 827,347
Stand, W. H. Smead 827,575
Steam boiler water circulating apparatus, J. N. Barnum 827,203
Sterilizer and pasteurizer, S. G. Scanlon .. 827,396
Stoker, furnace, A. J. Maskrey 827,249
Stop motion for pit cages, hoists, etc., G. Dunkelberg 827,088
Storage bin, Warren & Fontaine 827,589
Stove, B. B. Cutler, et al 827,424
Stove ash dump, A. C. Anderson 827,281
Stove grate, B. B. Cutler, et al 827,425
Stove lifter, A. A. Zagst 827,492
Stump extractor, L. & J. S. Swenson 827,271
Superheater, A. Cotton 827,145
Surgical instrument, G. Thrash 827,193
Switch and signal apparatus, C. W. Coleman 827,142
Switch stand, Robertson & Richardson 827,326
Switch thrower, electromechanical, J. A. Posey 827,323
Syringe, aseptic, McElroy & Randall 827,383
Syringe, hypodermic, F. W. Korb 827,693
Taps, making screw, F. E. Johnson 827,533
Tar for the manufacture of pitch and recovery of light oils treatment of, W. Oppenheimer 827,113
Target trap, W. S. Bowers 827,413
Telegraph system, L. de Forest .. 827,523, 827,524
Telephone attachment, H. E. Smith 827,576
Telephone, desk, S. C. Houghton 827,692
Telephone transmitter, C. C. Gilchrist 827,625
Telephony, I. Kitsee 827,449
Tent peg, J. E. Gorrell 827,438
Testing instrument, F. H. Schauffler 827,397
Threads, apparatus for the production of artificial, E. W. Friedrich 827,434
Threshold gage, J. A. Anderson 827,284
Tickets, checks, etc., holder for, A. F. Macdonald 827,105
Tickets, records, etc., holder for, A. F. Macdonald 827,104
Tile laying carrier, H. M. Fisk 827,301
Tile press, P. L. Simpson 827,472
Tire covers, manufacturing, E. Zohlen 827,404
Tire, cushion, W. H. Parham 827,321
Tire, vehicle, F. E. Newcomb 827,556
Toilet attachment for chairs, B. M. Suter. 827,192
Tool, combination, R. Mason 827,167
Tool, combination, J. H. Daniels 827,426
Track liner, Wulff & Ham 827,491
Track sander, F. B. Corey 827,294
Transporting solids, apparatus and method for, W. T. Donnelly 827,296
Tricycle, G. A. Larson 827,243
Trolley pole head, J. M. Fleming 827,090
Trolley pole, non-reversing two way running, H. Quertier 827,325
Trolley retriever, T. Blixt 827,344
Truck, W. O. Webster 827,590
Truck, railway and tramway vehicle, H. Gummi 827,362
Truck, scale, Thompson & Sheldon 827,580
Tube cutting machine, J. W. Freeman 827,227
Tubes, adjustable compressor for flexible, J. J. Jessup 827,640
Turbine, J. H. O. Bunge 827,141
Typewriter, vertical plane, H. S. Dukes. 827,514
Typewriting machine, J. Ziegler 827,136
Typewriting machine, G. M. Kitzmiller ... 827,538
Typewriting machine platen, H. J. Halle .. 827,150
Umbrella, folding, F. L. Atherton 827,599
Underreamer, E. C. Wilson 827,595
Valve, W. Von Kothen 827,195
Valve block, P. H. Murphy 827,170
Valve construction, F. W. Felsberg 827,522
Valve, feed, J. L. Curran, reissue 12,516
Valve, float, E. H. Friedrich 827,435
Valve for water supplies, mixing, A. W. Warnock 827,588
Valve, graduated release, W. V. Turner .. 827,274
Valve, locomotive, A. E. Cooper 827,504
Valve mechanism, steam engine, F. Fosdick 827,433
Valve, puppet, T. Stebbins 827,190
Valve, triple, A. J. Brishn 827,291
Vehicle, G. A. Larson 827,244
Vehicle body, J. H. Anderson 827,071
Vehicle coupling, L. Evensen 827,431
Vehicle, electrically operated, H. Ducasse. 827,687
Vehicle gear, C. H. Holdredge 827,445
Vehicle signal, A. H. Rosing 827,265
Vehicle spring, H. R. Rockwell 827,569
Vehicle wheel, G. W. T. Akehurst 827,494
Vehicle wind guard, motor, G. B. Levy .. 827,377
Velocipede, S. Tresouthick 827,481
Vending machine, E. C. Janson 827,448
Ventilator, Be Quette & Sackett 827,603
Vessels, means for raising sunken, J. G. F. Tito 827,477
Vessels, propelling mechanism for, W. W. Cox 827,619
Wagon raiser, T. & J. T. Lewis 827,543
Wall, sea, H. Winter 827,279
Wardrobe, M. W. Burtch 827,292
Washing and disinfecting apparatus, J. G. Branch 827,610
Washing machine, F. Brucker 827,140
Washing machine dasher or stirrer head, W. H. Voss 827,336
Watch balance staff protector, J. R. G. Addington 827,137
Water, apparatus for purifying, Sheuerman & Hand 827,399
Water, apparatus for purifying and softening, Sheuerman & Hand 827,400
Water heater temperature regulator, steam, J. D. Bowne 827,608
Water level, device for indicating at a distance the height of a, F. Rittmeyer 827,182
Water tube boiler, sectional, Y. Wadagaki 827,585
Windmill, W. P. Brett 827,611
Windmill speed jack, O. M. Mendenhall ... 827,252
Window fastener, screen and storm, J. W. Councilor 827,083
Window lifting and closing device, C. Sommer 827,401
Wire drawing machine, J. A. Horton 827,371
Wire fence machines, steering and brake mechanism for, C. F. Leonard 827,695
Wire reel, A. Asper 827,598
Wire splicing tool, W. H. McCloud 827,552
Wire stretcher, W. H. Culp 827,085
Worsted balling machine, automatic, G. J. Torrance 827,332
Wrapping machine, M. H. Ballard 827,285
Wrench, W. I. Measer 827,250
Wrench, H. B. Shaver 827,672
Writing machine, J. B. Vidal 827,584
Zinc and other metals, refining, Callmann & Bormann 827,418

DESIGNS.

Badge, F. B. Davison 38,137
Bottle, G. Buton 38,139
Button, W. J. Wolff 38,135, 38,136
Cake stand, H. Paurowicz 38,140
Carpet border, F. A. Haas 38,154
Curtain, lace, J. R. Gibb 38,152
Fabric, textile, D. Z. Merchant 38,153
Hammock, I. E. Palmer 38,151
Incense burner, J. M. Schutz 38,142
Lamp, gas, J. Doorenbos 38,143
Lighting fixtures, backpiece for, H. E. Watkins 38,144, 38,148
Shoe, C. B. Perry 38,150
Spoon or similar article, G. E. Homer 38,138
Tobacco pipe bowl, C. H. Culpepper 38,141
Work table, G. Little 38,149

TRADE MARKS

Battery cells, hard rubber, American Hard Rubber Co. 54,860
Books, account, R. Hollingworth 54,828
Boots and shoes, leather, H. W. Crooker Shoe Co. 54,824
Boots and shoes, leather, Shoemart Company 54,837
Bottle nipples, nursing, Davidson Rubber Co. 54,808
Cabinet for medicine, portable, Home Physician Co. 54,847
Calendars and show cards, fancy, International Art Publishing Co. 54,848
Canned, bottled, and preserved fruits and vegetables, L. De Groff & Son 54,891
Canned salmon, Bandon Packing Co. 54,888
Canopies, bed, Southern Canopy Co.. 54,797, 54,798
Cards, playing, United States Playing Card Co. 54,800, 54,801
Catsup, tomato, Wm. Henning Co. 54,908
Cement, Portland, I. C. Johnson & Co. 54,785
Check protectors, C. P. Nutter 54,878
Checks or slips and checkers' sheets, Hotel Security Checking Co. 54,829
Chimneys, lantern globes, and reflectors, glass, Gill Brothers Co. 54,845
Cigarettes, Butler-Butler 54,772, 54,773
Cigarettes and tobacco for cigarettes, Nestor Gianaclis Co. 54,790, 54,791
Cigars, L. K. Pope 54,794
Cigars, Havana, Havana Commercial Co. 54,826
Cloth cleaning preparation, C. Petersen 54,793
Cloths and stuffs of wool, worsted, or hair, Edward Ripley & Son 54,823
Coats, vests, and pantaloons, boys', Greenstein, Simon & Leerburger 54,900
Coffee, Browning & Baines 54,889
Coffee, G. B. Farrington Company..54,895 to 54,899
Coffee cereal substitute, Decatur Cereal Coffee Works 54,892
Cooking vessels, earthenware, J. W. McCoy Pottery Co. 54,850
Cords, blades, tapes, and fabrics, stiffening, Warren Featherbone Co. 54,905, 54,906
Cork or corkwood, Gudewill & Bucknall, 54,777 to 54,783
Cream separators, centrifugal, Vermont Farm Machine Co. 54,882
Cream separators of all kinds, De Laval Separator Company 54,868
Drills and drilling machines for drilling in metal, Ajax Manufacturing Company .. 54,858
Embroideries, silk, Lion Bros. Co. 54,903
Fabrics, printed and dyed textile, Eddystone Manufacturing Company 54,820, 54,869
Fabrics, textile, Eddystone Manufacturing Company .....54,811 to 54,818, 54,821, 54,822
Fertilizers, Virginia-Carolina Chemical Company 54,802
Files and rasps, G. & H. Barnett Company 54,872, 54,873
Food and farina made from wheat, Breakfast, Sleepy Eye Milling Company 54,881
Fruits or vegetables, hermetically sealed, Aughinbaugh Canning Company 54,864
Grates, fireplace, Aldine Grate & Mantel Co. 54,859
Gum shellac, Alden & Co., Geo. A. 54,768
Hat pins, combs, and hair pins, gold, Krementz & Co. 54,831
Hosiery, Des Moines Hosiery Mills 54,809
Hosiery, Weeks and Ascher 54,884
Jars, fruit, Hazel-Atlas Glass Company 54,846
Journals, trade, Ware Bros. Company, 54,839 to 54,842
Knit undershirts and drawers, Cooper Underwear Co. 54,890
Knitted underwear, G. W. Schlichten 54,904
Knives and razors, pocket, Northfield Knife Company 54,877
Knives, carving, Landers, Frary and Clark .. 54,875
Lamp glasses and globes, Macbeth-Evans Glass Co. 54,834
Leather, harness, Haffner Bros. 54,825
Leather polish, Whittemore Brothers & Co. 54,803
Linings, Eddystone Manufacturing Company 54,819
Linoleums, P. O. Judson & Co. 54,902
Magazine or periodical, monthly, J. Shepherd Clark Company 54,849
Matches, safety, Jonkopings och Vulcans Tandsticksfabriksaktiebolaget 54,851
Meats, smoked and pickled, F. A. Ferris & Co. 54,894
Mustard, Wm. Henning Co. 54,909
Neck ties and scarfs, men's, Weld, Colburn & Wilckens 54,843
Newspapers, Manufacturers' Record Publishing Co. 54,853
Oil, salad, Wm. Henning Co. 54,886
Olives, Wm. Henning Co. 54,910
Paint, mixed, Chas. R. Long Jr. Co. 54,807
Paints, damp resisting, Toch Brothers 54,799
Paper board, parchmentized, Leatheroid Manufacturing Company 54,832
Paste, flour, E. Hoffmann 54,784
Patent leather, calfskins, and waxed calfskins, C. Heyl 54,827
Pencils, lead, Eagle Pencil Company 54,810
Pens, certain named, Thomas De La Rue and Co. 54,832
Pens, fountain, S. L. Kiser & Co. 54,830
Pickles, certain named, Wm. Henning Co.. 54,907
Picks, mattocks, grub hoes, and eye hoes, Simmons Hardware Co. 54,880
Playing cards, New York Consolidated Card Co. 54,836
Powder, washing, Ruschhaupt Bros. 54,795
Publications, serial, Railway Equipment & Publication Co. 54,855, 54,856
Relishes, Wm. Henning Co. 54,885
Rubber boots, shoes, and overshoes, M. D. Wells Co. 54,833
Sauces, Wm. Henning Co. 54,887
Saws, circular, band, hand, and crosscut, Joshua Oldham and Sons 54,874
Seesaws, roundabouts, and teeters, E. D. Smith 54,796
Sheet metal, dovetailed corrugated, Brown Hoisting Machinery Co. 54,866
Shoe polish, American Chemical Manufacturing & Mining Co. 54,769
Show cases, Sun Manufacturing Co. 54,857
Silk piece goods, Aitken, Son & Co. 54,805
Snap fasteners for skirts, sew on, Scovill Manufacturing Co. 54,879
Soap, Cresenola Soap Co. 54,775
Soap, Fels & Co. 54,776
Soap, toilet, Iowa Soap Company 54,786
Soap, toilet, J. G. Mouson & Co. 54,789
Soaps, J. G. Mouson & Co. 54,788
Soaps, toilet and medicated, Lehealol Preparation Co. 54,787
Soluble oil and grease, Arabol Mfg. Co. 54,806
Spices, A. G. Groblewski 54,901
Spool cotton and thread, American Thread Co. 54,861
Spool cotton, sewing cotton, and thread, American Thread Company 54,862, 54,863
Springs, bed, Chas. A. Maish Co. 54,844
Steel, high speed cutting, Firth Sterling Steel Co. 54,870
Steel, tool, Firth Sterling Steel Co. 54,871
Stones and hones, scythe and abrasive, Morton Emery Wheel Co. 54,792
Tables, W. J. Maddox 54,852
Tobacco, chewing, Bailey Brothers 54,770
Tobacco, smoking, Butler-Butler 54,774
Trousers, Dutchess Manufacturing Co. 54,893
Twist drills, B. M. Jones & Co. 54,865
Violins, violoncellos, violas, and parts of such instruments, M. B. Hern 54,854
Washing machines, bottle, M. C. Rosenfeld Co. 54,876
Washing powder, D. S. Brown 54,771
Watch movements and watchcases, L. Manheimer & Bros. 54,835
Watches, J. B. Abernethy 54,804
Yeast in solid form, Vienna Pressed Yeast Co. 54,883

LABELS.

"D-Lish-Us Gum," for chewing gum, American Vending Machine Co. 13,027
"Daisy," for canned lobster, J. A. Neville. 13,022
"Dr. Le Brose Anti Dyspepsia Tablets," for medicine for the treatment of dyspepsia, New York Remedy Co. 13,029
"Espenella," for cigars, R. & A. Abrams.. 13,019
"Hawaiian Pineapple (Long Wafers)," for pineapples, Tropic Fruit Co. 13,024
"Hawaiian Pineapple (Round Wafers)," for pineapples, Tropic Fruit Co. 13,025
"Hershey's Milk Chocolate Wafers," for chocolate candy, P. R. Warren Co. 13,026
"Mac Riek Whiskey," for whiskey, McLaughlin & Riekenberg 13,018
"Man-a-lin the Ideal Laxative," for liquid purgative compounds, Manalin Co. 13,028
"Milk-Amon-Oat," for a toilet washing powder, J. Sherin 13,031
"Prize Medal," for evaporated apples, Young & Beach 13,023
"Pur-O-Wheat," for cereal food, F. T. Van Strum 13,020
"Safety Benzine," for a preparation of benzin treated to render it non-explosive, Safety Benzine Co. 13,032
"Santy Claus Oats," for oats prepared for food, Geo W. Stout Co. 13,021
"Skidew," for a breath purifier, L. A. Miller 13,030
"The Kismet Multi-Doo," for a combined paper cutter, envelop opener, paper clip, book mark, pencil sharpener, pen and pencil holder, ink eraser, rule, book opener, note book rest, and copy guide, A. Hering 13,033
"Wentworth Street Carbonated Water," for carbonated water, J. Kornahrens. 13,017

PRINTS.

"Autocrat and Baronial Backs, Bridge Series, Congress Playing Cards," for playing cards, United States Playing Card Co.. 1,749
"Captain Kidd Back, Congress Playing Cards." for playing cards, United States Playing Card Co. 1,750
"Diamond Carbonic Fire Extinguisher," for fire extinguishers, Liquid Carbonic Co. 1,744
"Dragon," for playing cards, Willis W. Russell Card Co. 1,748
"Emerson's Bromo-Seltzer," for a medicine, Emerson Drug Co. 1,741
"Home Made," for sausage, F. G. O. Schnoor 1,742
"McArthur's Fire Escape and Jacob's Ladder," for fire escape ladders, M. J. McArthur 1,745, 1,746
"Pratt Food Co., of Philadelphia," for animal and poultry regulators and veterinary remedies, Pratt Food Co. 1,740
"Prompt Service," for lumber products made of cedar, yellow pine, fir, and spruce, C. H. Asling 1,747
"The Cobbler," for shoes, McLeod & West. 1,743

Index of Inventions for which Letters Patent of the United States were Issued for the Week Ending August 7, 1906.

A-frame, Ferris & Magie 827,794
Agricultural implement, G. C. Stanley 827,148
Air brakes and means to start automobiles, G. W. Young 827,839
Air compressor, rotary, G. Hermansen 828,111
Air, means for increasing the work obtainable from a charge of compressed, W. H. Sodeau 827,891
Ale and beer casks, apparatus for maintaining air pressure in, E. R. Brown .. 828,270
Alkamin ester, Stolz & Korndorfer..828,070, 828,071
Anesthetics, apparatus for administering liquid, J. A. Hollenberger 827,910
Animal trap, C. T. Owens 828,139
Asbestos, treating, A. H. Hipple 828,114
Ash pit door, A. E. Johnson 828,118
Audiphone, pocket, E. W. Schneider 828,292
Automatic signal, W. A. True 827,947
Axle and wheel, T. E. Lambert 828,127
Axle, vehicle, R. H. Berkstresser 828,179
Bales, means for compressing, S. J. Webb .. 827,833
Baling press, cotton, Jones & Vincent ... 828,213
Ball pitcher and catcher, O. J. Punches 828,244
Basket making machine, J. Farrell, 828,278, 828,279
Baskets and trucks, metallic frame for, Morris & Staples 828,232
Bearing, ball, Harris & Dearing 827,865
Bearing for revolving shafts, P. Schou 828,058
Bearings, lubricating spindle, an Haack & Knoblauch 827,731
Bed attachment, J. P. Williams 828,164
Bed pan, A. E. Betts 828,178
Bed, sofa, W. J. Kelly 828,215
Bedstead attachment, C. P. Brown 828,185
Belt fastener, I. Jackson 827,869
Belt, waist, H. J. Gaisman 827,859
Berth and settee, combined, folding, J. P. Lein 828,035
Berth, collapsible, J. P. Lein 828,131
Binder, loose leaf, E. A. Trussell 827,895
Block. See Follower block.
Blotting pad, J. Velt 827,832
Blowing machinery, A. C. E. Rateau 827,750
Boat, B. Tenneson 828,072
Bobbin boring machine, C. L. Bailey 828,176
Book, banking, F. McClain 827,935
Book marker, adjustable and automatic, J. F. Wise 827,837
Books, manifolding sheet for loose leaf, C. Rust, Jr. 827,754
Boring rods, supporting means for, A. McNamara 827,814
Bottle, I. C. Dilks 827,853
Bottle, M. J. Fitzsimmons 828,103
Bottle filling machine, C. F. Jenkins 828,117
Bottle lock, G. A. Quimby 828,053
Bottle, non-refillable, J. B. Zorn 827,900
Bottles, machine for capping, H. Robinson 828,055
Box, F. L. Upjohn 828,151
Brake beam fulcrum, reversible, F. W. Cox 827,788
Brake shoe fastening, S. Webb 828,159
Bread making compound, H. F. Solliday 828,251
Bridle bit and its connections, S. Pollock 827,818
Brush and comb, combined, T. J. McCloskey 828,234
Brush, tooth, G. Engel 827,965
Bucket blanks, producing, P. A. Lorenz 828,226
Bucket, trip, P. Entringer 828,025
Buggy boot closure, Bartholomew & Schultz. 828,082
Building material, M. W. Marsden 828,041
Button, S. Gray 827,971
Cabinet, J. L. Coleman 828,194
Cabinet, knockdown, P. Morrison 828,133
Cable joint housing, J. Anderson 827,951
Cable take up, Fuller & Bateman 828,282
Call system, W. J. McCollom 828,235
Camera bellows support, J. Goddard 828,106
Camera, photographic, J. Frachebourg 827,967
Can body forming machine, J. Eldridge 828,024
Can heads, means for detecting defective, G. H. Stewart 827,760
Candle socket, H. F. Nehr 828,238
Canister top, W. S. Stanley 827,821, 827,822
Car coupling, A. J. Blazeley 828,177
Car coupling release rigging, J. E. Ulsh ... 827,948
Car, double decked, Luce & Lambert 827,807
Car, electric tram, G. J. Conaty 827,710
Car, gondola, R. G. Hutchins 827,289, 828,290
Car, railway, C. Zimmerman 827,899
Car replacer, N. F. Hess 828,112
Car uncoupling mechanism, A. J. Bazeley .. 828,266
Car underframes, draw bar spring pocket attachment for metal, H. M. Pflager ... 827,749
Car wheel, self oiling, R. F. Phillips 828,242
Carbid, manufacture of, H. L. Hartenstein, reissue 12,519
Carbureter, A. W. & W. K. Menns 828,228
Carbureter, H. B. Cornish 828,274
Carbureter, T. H. Glasscoe 828,284
Carpet fastener, stair, F. W. Wright 828,0
Cartridge cleaning apparatus, J. H. Hart .. 827,866
Cash recorder, S. Dement 828,021
Cash till and register, F. W. Baynes 827,779
Cattle guard, J. W. Wyatt 827,774
Centrifugal separator, J. J. Berrigen 827,903
Chain coupling, boom, A. J. Foucher 827,795
Chair. See Folding chair.
Change making machine, J. W. Meaker .. 827,986
Cheese cutter, A. K. Gillespie 828,105
Cigar cutter, E. Brunhoff 828,087
Cigar tip cutter, E. Brunhoff 828,088
Cigarette making machine, C. de Cazen 827,848
Circuit interrupter, electrical, H. Besser .. 827,781
Clip, A. E. Glascock 828,205
Clothes draining device, L. T. Cook 828,195
Clothes line holder, A. K. Young 828,169
Clutch, A. F. Hanson 828,027
Clutch mechanism, J. & F. Doepker 827,715
Coin holding and delivering machine, J. W. Meaker 827,985
Coking oven, H. J. Wickham et al. 827,767
Collapsible gate, C. Meyer 828,229
Collar pad, horse, D. S. Brown 828,186
Collar, pneumatic horse, J. R. Burkholder .. 827,765
Collars, machine for riveting horse, A. W. Berndt 827,701
Combs, making, J. Koenig 827,733
Composition of matter, L. F. Johnson 827,977
Composition, priming, K. W. Will 827,768
Concrete, reinforced, A. Thomas 827,892
Concrete tanks and buildings, holding and raising forms for building, F. E. Vansant 828,076
Concrete wall mold, J. J. Daniel 827,712
Condenser, C. Mild 828 042
Condenser, J. Schwager 828,060
Continuous piston engine, J. C. Jarvis 827,870
Corn elevator, A. Otto, Jr. 828,239
Cornet, C. G. Conn 828,273
Cot and crib, combined, A. W. O'Blenus ... 828,001
Cotton compress, S. J. Webb 828,002
Cotton gin roller, H. Peterson 828,241
Cotton picker, H. P. Childress 828,018
Counting machine, stop, G. Hoepner 828,209
Cover removing mechanism, G. Webster 828,003
Crate, shipping, B. S. McCain 827,877
Cream and milk cooler, Carter & O'Sullivan 827,708
Cultivator, W. L. Tucker 828,074, 828,075
Cultivator, S. L. Allen 828,171, 828,172
Cultivator drag bars or beams, adjusting device for, S. E. Bailor 828,265
Current motor, N. R. Smith 827,889
Curtain protector, E. Wohlgemuth 827,838
Cuspidor, L. K. Vale, Jr. 828,152
Cuspidor holder and cleaner, J. D. De Lange 828,275
Cutting die, P. A. Lorenz 828,225
Cycle, ice, F. W. Lehman 828,130
Damper, M. McCormick 828,135
Damper, automatic stove, W. R. Bond 827,955
Dash pot, H. M. Crane 828,091
Dental articulator, F. W. Stephan 827,824
Dental metal crowns, apparatus for stamping and shaping, A. Grunstein 828,109
Desk, folding, L. & A. Jensen 827,913
Desk, school, W. C. Toles 827,830
Desk seats, hinge for school, J. Zimmer 827,950
Die stock, H. J. Carmody 828,191
Dipper, cream, L. B. Mandeville 828,040
Directory, telephone, D. F. Whitcomb 828,161
Display stand, Junkins & Woods 827,980
Ditching machine, J. B. Hill 828,208
Door closer, E. V. Sinz 828,063
Door hanger and fixture, sliding, K. McLeod 827,878
Double draft kiln, D. P. Guise 828,285
Draft equalizer, J. A. Smethers 827,888
Draft regulator, G. H. Tarleton 828,255
Dredge, steam and hydraulic, T. Shade 828,141
Drill disk scraper, T. Brennan, Jr. 828,183
Drill holder, portable, T. B. Powers 828,051
Drilling jig, automatic, C. H. Darling ... 827,790
Drum oil guard, friction, A. Lambert 827,922
Drums, friction thrust for loose, A. Lambert 827,921
Duck call, J. W. Reynolds 827,819
Dust guard, F. E. Holt 827,728
Dust laying and absorbing composition, B. Singer 827,887
Ear muffle, Engelman & Partenheimer 827,719
Eaves trough, D. L. Johnson 828,291
Egg case filler, Carrier & Shotts 827,961
Electric battery, I. Kitsee 827,914, 827,915
Electric cell, I. Kitsee 827,917
Electric circuit, I. Kitsee 827,918
Electric circuit coupling apparatus, N. F. Niederlander 827 988
Electric elevator, D. Larson 827,924
Electric light pendant, extensible, G. B. & R. C. Clarke 827,849
Electric motor support, J. G. Crawford 828,092
Electric transmission of intelligence, I. Kitsee 828,217
Electrical controller, D. Larson 827,923, 827,925
Electrical interrupter, H. Besser 827,782
Electromagnetic locking switch, H. M. Crane 828,090
Electrostatic separator, M. Woodsome 827,770
Elevator. See Corn elevator.
Elevator, J. Wunderlich 828,009
Elevator, C. W. Jackson 828,029
Embroidering machine presser foot, G. W. Lankford 827,737
Enameled ware, manufacturing clean edges in, K. Gossweiler 828,107
Engines, automatic alarm and stopping device for, D. B. Adams 827,698
Engines, means for reversing and controlling internal combustion, J. W. Slater 828,064
Exercising apparatus for correcting deformities, F. Langel 828,221
Explosive engine igniter, J. Boyle 827,904
Extension table, F. J. & J. T. Seng 827,944
Eye for garment hooks, sheet metal, G. E. Barber 827,841
Eyeglasses, A. A. Low 827,740
Eyeglasses, L. L. Stone 828,253
Fabric, machine for shrinking, Carleton & Brooks 828,017
Feed and litter carrier, W. D. Beath 827,842
Feeding device, poultry, W. J. Manly 828,227
File, newspaper, H. L. Snyder 828,067
Filter, F. Benoit 827 780
Finishing machine, edge, A. E. Ayer 828,013
Fire alarm system, P. E. Tariton 828,000
Firearm, tubular magazine, T. C. Johnson, 827,978, 827,979
Fire protection signal system, J. E. Shepherd 828,047
Fire protection system, J. G. Nolan 828,045, 828,046
Firearms, cartridge carrier for, A. J. Savage 827,820
Fish hook, W. Shakespeare, Jr. 827 757
Fish plates, manufacturing, R. B. Charlton 828,272
Fish stringer and carrier, W. J. Farmer 827,855
Fishing reel, J. J. Grignon 827,972
Fishing rod case or holder, E. A. Lamphier 827 736
Floor scraper, H. S. Durkee 827,791
Flour flakes produced by the smooth rolls in flour milling and for kindred purposes, apparatus for conveying and disintegrating, G. Hudson 827,912
Fluid feed indicator, visible, C. L. Graham 828,108
Fluid pressure brake, G. L. Starr 827,823
Fluid pressure brake, A. Parker-Smith 827,880
Flushing tank, B. Eastwood 827 716
Fly and other insect escape, V. Oberting 828,048
Folding chair, H. Nichols 828,136
Folding table, L. K. Gibbs 827,722
Follower block, B. C. Bradley 827,957
Foods, drying, A. T. Jones 827,730
Foot scraper, F. C. Lancaster 828,220
Forceps, J. Somers 828,146
Fork, L. E. Fatch 827,856
Foundry flask clamp, O. F. Lindberg 827,874
Fuel feeding apparatus, fine, G. L. Swift .. 827,898
Furnace, A. Locher 827,875
Furniture sliding shoe, O. C. Little 827,806
Gage glass holder, H. Del Mar 827,713
Game table, M. M. Johnson 828,211
Garment clasp, E. H. Heath 827,801
Garment hook, F. D. Scott 827,885
Gas burner, incandescent, M. H. Samson .. 827,755
Gas engine, H. J. Smith 827,759
Gas engine, P. Mohrdieck 827,810
Gas main bag, J. H. White 827,835
Gas, producing, H. Gerdes 827,862
Gear, firing, S. A. S. Hammar 827,725
Gear, friction draft, G. I. King 827,804
Gear, variable speed and reversing, F. Markgraf 827,742
Generator and superheater, S. Z. de Ferranti 828,202
Glass furnace, D. J. Ghrist 828,283
Glass, manufacturing, Speer & Harvey 828,147
Glassware, machine for the manufacture of pressed and blown, C. E. Blue 828,180
Glue press, G. F. Steger 828,069
Governor, engine, E. Hill 827,727
Grater, vegetable, J. Charky 828,193
Grinding mill, J. N. Basch, Jr. 827,703
Grinding mill, J. H. Reece 827,883
Gun barrel, C. R. Bellamy 827,844
Hanger. See Picture hanger.
Harvester, F. Hamachek 827,723
Harvesting machine, cotton, J. F. Appleby. 828 264
Hay carrier, W. Louden 827,928
Hay press, B. C. Bradley 827,956
Hay rake, E. A. Johnston 828,119
Head gate, U. F. McBurney 828,233
Headlight, locomotive, E. C. Sawyer 827,943
Headlight operating device, Gardner & Furber 827 969
Heat radiating pin, H. A. Knox 827,732
Heating furnace, rotary, J. McGaff 827,813
Heating system, J. O'Neill 828,138
Hinge construction, locking, W. J. Kelly, 828,123, 828,124
Hinge for sofa beds, etc., reversible, O. H. Watkins 828,157
Horseshoe, M. D. Glassbrooke 827,797
Horticultural and other structures, glazing of, E. Bouteille 828,084
Hose coupling, J. F. Polmann 828,243
Hydrocarbon apparatus, J. Landsiedel 828,034
Incubator, H. C. & E. C. Aiken 828,011
Incubator, G. H. Boyd 828 181
Injector, water pressure, J. H. Venners 828,154
Ink well, J. Muirhead 828,043
Insulating coverings, form for making fiber, W. H. Baker 827,777
Iron or steel articles, manufacture of, E. E. Pierce 827,882
Iron or steel objects, treating, H. L. Hollis 827 802
Ironing board, J. H. Wilkins 827,949
Ironing stands and the like, wheeled support for, W. H. Flake 827,966
Jar and jar closure, J. E. Lord 828,038
Jars for the preservation of foodstuffs, composition of matter for hermetically sealing, J. E. Lord 828,039
Journal box, G. A. Woodman 828,261
Journal box lubricating device, J. G. Smith 828,066
Kitchen table and cabinet, G. A. Stromgren 827,761
Knockdown table, J. S. Westby 827,834
Knuckle pin stop block, G. A. Hart 827,974
Lacer, shoe, Miles & Young 827,987
Ladder, F. B. Pease 828,049
Lamp burner, J. H. Morrison 827 812
Lamp guard, C. Molitor 827,811
Lamps, means for automatically extinguishing, E. J. Frost 827,796
Lead refining apparatus, A. G. Betts 827,702
Leaf-turning apparatus for books, music, etc., L. G. Giles 827,970
Leg, artificial, W. E. Erwin 827,720
Letter and inclosure, combined illustrated, J. T. H. Mitchell 827,809
Leveling rod, E. Wiswall 828,166
Lid fastening means for receptacles, J. A. Snigo 828,144
Lifts, elevators, conveyors, etc., means for controlling electric, H. C. E. Jacoby. 828,210
Light fixture, W. B. Brown 827,783
Liquid dispensing apparatus, recording attachment for, E. C. Graham 827,798
Liquid filling apparatus, S. Schlangen ... 828,057
Loading and unloading device, P. E. Van Berendonck 827,831
Locks, locking device for permutation, F. Duesterwald 828,276
Log, Stay, Smith & Briner 828,065
Loom jacquard actuating mechanism, E. A. Schneider 827,997
Loom picking mechanism, W. T. Roper 827,996
Loom shuttle, A. E. Benson 827,953
Loom shuttle positioning device, F. O'Donnell 827,937
Lounging chair, W. Williamson 828,079
Lumber joining machine, A. T. Linderman. 827,738
Mail bag holder, W. E. D. Everest 827 793
Mail boxes, crane for rural, J. B. Mellinger 827,929
Mantle burner, acetylene, C. Holmok 828,028
Match box, O. C. Sobolewski 827,890
Match box, G. A. Demo 828,094
Matrix making machine, L. E. Levy 827,872
Merry-go-round, W. W. Tice 828 073
Metal hoop, J. E. Wright 827,773
Metal treating, refining, and purifying apparatus, W. S. Simpson 828,142
Metals, making composite, T. A. Edison .. 827,717
Meter. See Steam meter.
Microscope, micrographic, O. H. F. Vollbehr 827,896
Milk can seal, W. F. Brunssen 828 187
Milk pail support, J. Kuhn 827,734
Milk receptacle, Maxwell & Kingsbury 827,984
Mining machine, coal, S. N. Mighell 827,746
Miter box, W. B. Spear 828,252
Mold, I. Robbins 828,140
Molding machine, H. J. Schade 828,056
Motor, W. G. Bloss 827,845
Motors, commutating alternating current electric, H. Weichsel 828,077
Mower or reaper guard finger, F. Hamachek 827,724
Musical instrument reed holder, E. D. Snodgrass 828,145
Musical notation, A. C. Davis 828,020
Nest, poultry, A. C. Chase 827,709
Nest, trap, H. G. Leisenring 828 224
Net, H. J. Hughes 827,868
Noodle machine, H. Herschel 828,207
Nut lock, H. B. Eareckson 827,908
Nut lock, J. J. Potter 827,941
Nut lock, T. Cronin 828,019
Nut lock, B. W. Dicken 828,096
Nut lock, L. W. Laye et al. 828,129
Oil burner, vapor, C. R. Umbenhower 827,764
Oil burning furnace, Yoerg & Treacy 828,081
Operating table, J. D. Williams 828,007
Oscillator, go-cart, sled, and step-ladder, combined, J. A. Crandall 828,197
Oxyacids of chlorin, producing salts of, A. E. Gibbs 827,721
Packing case box, etc., F. A. Wilson 828,165
Packing for stuffing boxes, metallic, A. Siems 828,249
Packing, piston, T. W. W. Smith 828,143
Pail, milk, L. Leavitt 828,222
Paper, J. H. Greenstreet 827,863
Paper box making machine, E. H. Taylor. 827,762
Paper, grease and moisture proof, A. Weingaertner 828,004
Paper holder, sticky fly, G. & G. C. C. Laube 828,128
Paper-making machinery, Wolf & Tidmarsh 828,167
Paper, paint, etc., moistener or softener for wall, M. E. Hamill 827 864
Paper roll holder, W. H. Hoell 828,115
Paper web in paper-making machines, apparatus for smoothing the, C. Tittel .. 828,149
Pea grader, J. H. Empson 827,909
Pen and pencil holder, C. Weaver 828,158
Pen, fountain drafting, Smith & Stokes .. 827,758
Pencil knife, J. H. Galland 827,860
Photographic printing apparatus, W. L. Bierbrauer 827,954
Piano action, L. H. Battalia 827,952
Piano attachment, automatic, F. P. Smith. 828,293
Picture hanger, C. S. Armstrong 828,012
Pin, W. E. Henderson 828,286
Pipe carrier, C. F. Porteous 828,050
Pipe coupling, A. J. Michel 828,230
Pipe cutting or indenting machine, W. Haas et al. 827,800
Pipe or hose coupling, C. E. Lingenfelter .. 827,739
Pipe wrench, J. W. Lind 827,873
Planter and marker, automatic check-row corn, R. F. Fleak 827,857
Planter, corn, L. D. Benner 828,267
Plow, W. H. Gant 828,104
Plow, S. V. Weeks 828,160
Plow attachment, N. G. Mercer 828,132
Plowshare, boltless, F. Huff 827,729
Poacher, steamer, and heater, combined, J. Truman 827,894

Post or letter card, R. C. Baker 827,840
Potato cutter and planter, J. J. Simon.... 827,946
Potatoes, knife for cutting seed, W. O. Cassady 827,906
Power table and power attachment for tables, J. T. & D. Beswick 828,083
Power transmitting device, O. Hoffmann.. 828,116
Press, C. E. Brooks 827,847
Printing machine feed, W. Fullard..... 828,281
Printing press, Sharp & Andrus 827,886
Pulley block, F. Burge 827,959
Pulley, track, F. 3. Clarkson 827,850
Pulp molding machine, G. R. Ward..... 827,765
Pulp molding machine, C. D. Ormiston.... 827,815
Push buttons, press tool for the manufacture of, G. F. & A. J. Grove..... 827,799
Pump, air, N. W. Dible 827,714
Pyrotechnic device, H. J. Pain..... 827,939
Rail bond, C. R. Sturdevant 827,827
Rail joint, J. D. Manese 827,741
Rail joint, Marshall & Dunn..... 827,743
Rail joint, W. J. Overton 827,991
Railway brake, S. Britton 828,184
Railway crossing track mechanism, J. W. Renner 828,054
Railway gate, electric, A. C. Worland.... 827,772
Railway signaling, T. E. R. Phillips..... 827,940
Railway switch, electromagnetic, R. A. Baldwin 828,014
Railway tie, E. W. Wimberly 827,769
Railway tie, A. B. Mason 827,808
Railway tie, J. W. Pepple..... 827,881
Railway tie, C. J. Kopf 828,219
Rake, See Hay rake.
Range, gas, H. W. Lawrence..... 827,871
Ratchet wrench, Bowser & Francis..... 827,846
Relay, W. W. Dean 827,964
Riveting device, J. Petrelli 827,994
Roasting or oxidizing furnace, C. E. Dewey 828,095
Rock breaker and pulverizer, W. A. Merralls 827,745
Rock splitting machine, F. Newnham..... 827,879
Roost and nest support, combined, J. R. Callahan 827,706
Rope untwisting machine, F. A. Kaiser.... 828,121
Rossing machine, J. Moreau 827,747
Rotary engine, O. Williams.....828,259, 828,260
Rubber warming and mixing mill, C. F. Obermaier 827,936
Rule, measuring, R. Morehouse 827,932
Sack tie, grain, W. T. Oxley..... 828,240
Sad iron, J. Ecker 828,023
Safe bolt actuating mechanism, E. A. Strauss 827,999
Sales check holder, E. D. McKenna..... 828,044
Sand mold making machine, H. Karow.... 828,214
Sash holding device, W. M. Ducker..... 828,099
Sash operating mechanism, G. P. Bull.... 828,188
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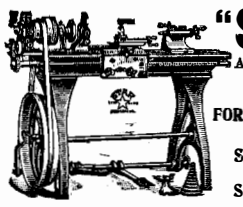

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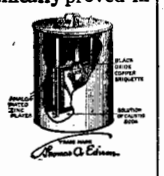

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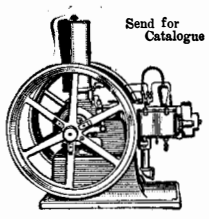

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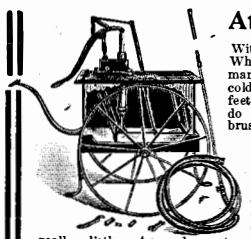

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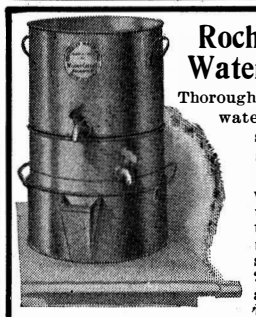

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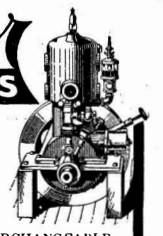

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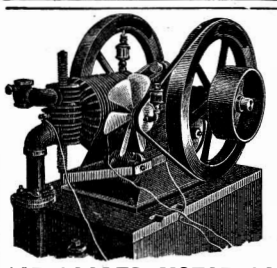

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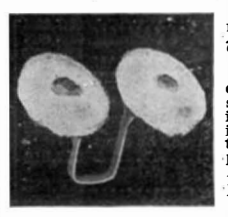

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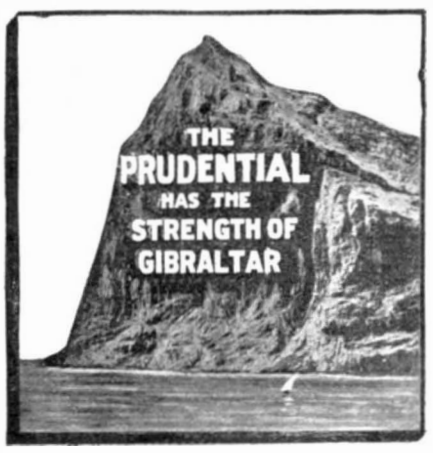

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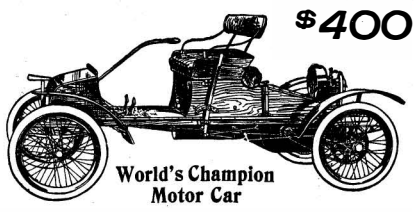

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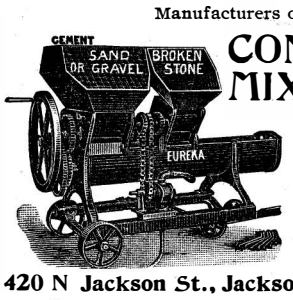

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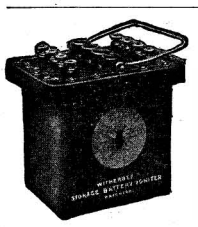

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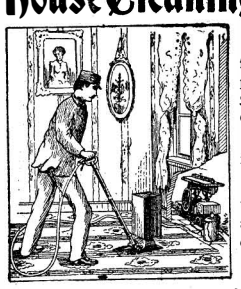

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A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

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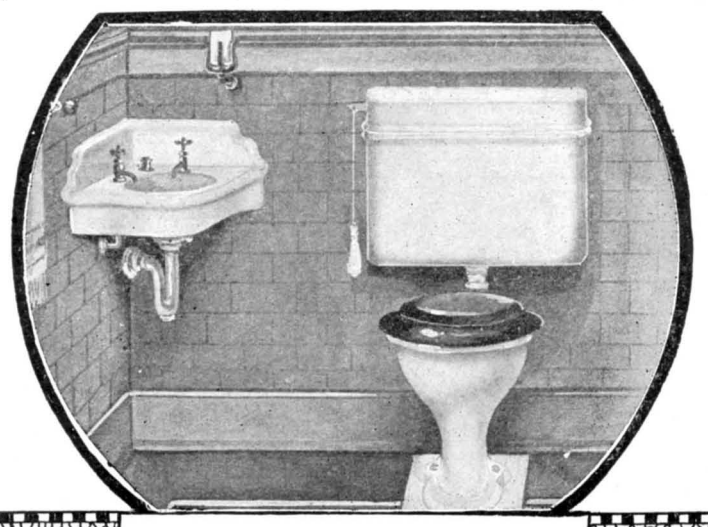

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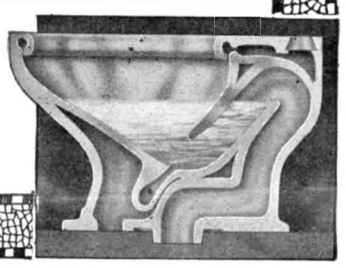

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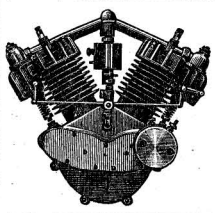

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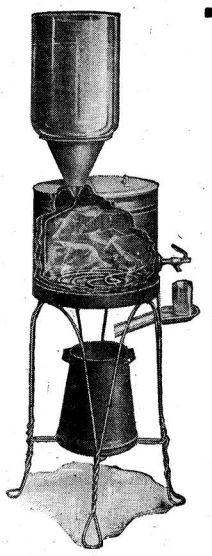

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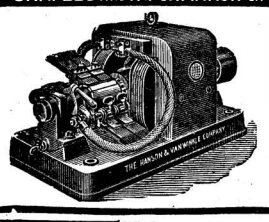

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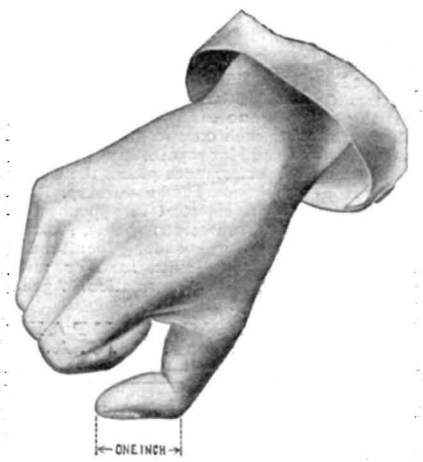

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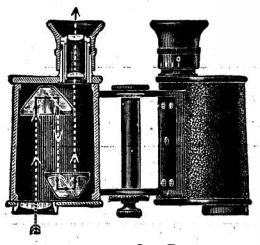

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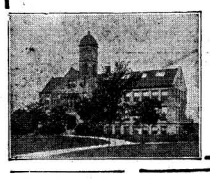

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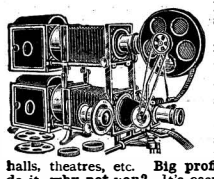

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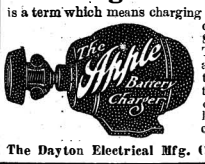

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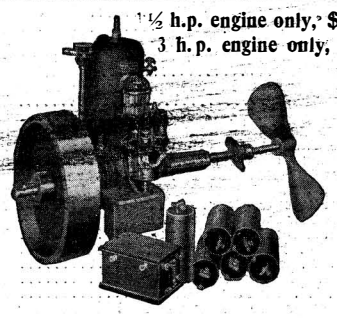

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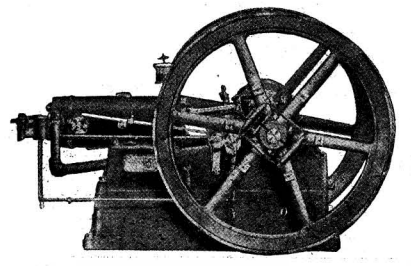

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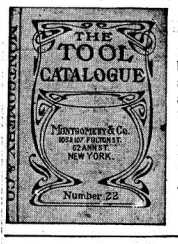

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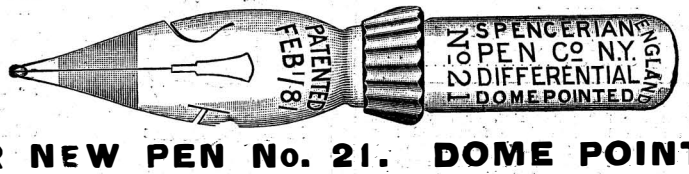

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